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# Accounting, Organizations and Society



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## THE USE OF BUDGETARY SYMBOLS IN THE POLITICAL ARENA: AN HISTORICALLY INFORMED FIELD STUDY\*

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### Abstract

Within accounting, an emerging perspective has held that budgeting is complicit in the creation of a social reality. Seen in such terms, budgetary dialogue is one manner in which societal expectations are expressed, thereby transforming contemporary organizations. Further, it is argued that organizational practice must specifically embody and reproduce these societal expectations in order for the organization to exist. This paper describes a field study directed at assessing the usefulness of such a perspective on budgeting by examining the nature of the budgetary process between a major state university and its state government.

Cyert & March (1963) have defined budgets as both the substance and result of political bargaining processes that are useful for legitimizing and maintaining systems of power and control within organizations (see also Zald, 1970a, b; Pondy, 1970). Similarly, Pfeffer (1981) argued that a particularly effective way of influencing resource allocation decisions is to do it as unobtrusively as possible, such as through the apparently objective mechanism of the budgetary process which tends to legitimate subjective and political decision-making processes (see also Pfeffer & Salancik, 1974, 1978). These theorists considered budgeting as a socially constructed phenomenon rather than a technically rational function driven by and serving the internal operations of organizations. Moreover, these perspectives recognized that once implemented, what a budgeting system accounts for shapes organizational members' views of what is important and, more radically, what constitutes reality.

Budgeting, then, has been implicated in the construction of a social reality rather than being the passive mirror of a technical reality (Cooper *et al.*, 1981; Covaleski & Dirsmith, 1983, 1986; Lindblom, 1959; and Wildavsky, 1964, 1975, 1979).

The purpose of our research is to extend these perspectives on budgeting by examining the biennial budgetary negotiations between a major state university and its state government. Importantly, the processes of power preservation and social change are examined against the backdrop of interactions between the university and a web of state agencies concerned with budgetary issues. In this social context, the entire budgeting process was problematic. Even the language used was contested by the principal actors — budgeters and budgetees alike — as revealed in the following interchange between the state university and the state government. According to the university:

\*We wish to gratefully acknowledge funding support for this research from the Graduate School of the University of Wisconsin-Madison. This paper was presented to and benefitted from the faculty colloquium of the Institute for Informatik & Økonomistyring at the Copenhagen School of Economics and Business Administration. We would also like to thank H. Thomas Johnson for his many helpful comments on an earlier version of this paper.

The University of Wisconsin has begun intensive training for what it expects will be a knock-down, drag-out battle for state tax dollars next year. After several years of grudgingly going along with a mechanistic, formula-funding methodology which has generated budget cutbacks, the University of Wisconsin has gone on the offensive. President O'Neill clearly has made a case that the University of Wisconsin cannot return to the status of a prestigious university if it is treated like the rest of state government and subject to a formula funding methodology. The University of Wisconsin has marched into this year's budget battle armed with formidable new weapons and a new strategy. The strategy abandons the traditional enrollment funding formula for a more qualitative, program-specific approach. The weapons are reports and documents used to support the program priorities and requests. These reports provide historical and peer reference data to reveal the severe underfunding of the University of Wisconsin in the past decade (*Capital Times of Madison*, 8 October 1982).

The contrasting position of the State was as follows:

In light of the Department of Administration's concerns regarding the form of the university's 1983-85 biennial budget request, the Governor chose to regard all individual instruction and library requests as expressions of priorities within a total amount of funding, that amount to be evaluated in terms of gubernatorial policy placing a high priority on university funding in light of a judgment that an investment of resources was appropriate. From a policy perspective, it is clear that the Governor does not endorse the form of the university's budget request (Department of Administration, *Executive Budget Policy Issue Paper*, State of Wisconsin, 1983-85 Biennial Budget).

From the outset, the political dimension of budgeting is present in the obvious schism between the university (the budgetee) and the State (the budgeter). The next section of this article, therefore, discusses in more detail the relationship between budgeting, politics and power, concluding that political perspectives are requisite to understanding budgetary practice. The second section describes the research methods the authors employed. The historical, political and social context of the university budgeting process is described in the third section. The analysis of the findings and concluding remarks are offered in the final two sections.

## BUDGETING WITHIN A POLITICAL CONTEXT

One basic theme this article explores is that

budgeting systems help to represent vested interests in political processes and to maintain existing power relationships. This theme appears to reflect two inter-twined positions: that concerned with control and organizations; and that concerned with control and a wider social context.

### *Control and the organization*

Wildavsky (1964, 1975, 1979) has long argued that budgeting systems achieve many purposes beyond control, that they are at once forms and sources of power, and that they serve both the guardians of scarce resources and the advocates of budgetary units. Wildavsky also reasoned that inherently conflictual organizations may use budgets to establish and maintain existing power relations, stating:

The bonds between budgeting and "politicking" are intimate. Realistic budgets are an expression of practical politics. The allocation of resources necessarily reflects the distribution of power. Budgeting is so basic it must reveal the norms by which men live in a particular political culture — for it is through the choices inherent in limited resources that consensus is established and conflict is generated (1975, p. xii).

Wildavsky further suggested that budgeting does not serve decision-making and problem-solving directly in a technically rational manner. Instead, he argued, decision-making and problem-solving are served by the sometimes asymmetrical political confrontation between budgeters and budgetees. Budgeting in this political context, in turn, is used to support the positions of the various constituents of budgeting in their confrontations. Wildavsky concluded that the political nature of budgeting may well be inherent in complex organizational life, and is not an aberrant defect in budgetary practice. On this point, Pfeffer concluded:

The task of political language and symbolic activity is to rationalize and justify decisions that are largely a result of power and influence, in order to make these results acceptable and legitimate in the organization (1981, p. 184).

Weick (1976; see also Pondy & Mitroff, 1978; Pfeffer & Salancik, 1978; and Zeitz, 1980) submitted that educational institutions in particular devote considerable effort to constructing and

legitimizing a social reality. These institutions are characterized by the equivocal nature of their goals, technology, and decision-making processes (Padgett, 1980). Here, a great amount of effort is directed at making sense of the world, particularly when the organization faces a scarcity of resources. Daft & Macintosh (1981) suggested that the messages provided in these linguistic efforts often attempt to accommodate multiple interpretations, thus providing information that is consistent with the ambiguous nature of the system. As Weick (1976) further stated, the chief responsibilities of institutional administrators are to provide a common language from which to reaffirm and solidify ties with outsiders through symbol management, consistent articulation of a common vision, and interpretation of diverse actions in terms of common themes.

More specifically in the accounting context, Burchell *et al.* (1980) argued that what gets "accounted for" shapes an organizational participant's view of what constitutes organizational reality by identifying the problems the organization chooses to address and the range of possible actions it considers appropriate. Rather than arising from and serving the quest for rationality, budgeting is used to lend the appearance of rationality. As organizational members articulate and promote their interests, they must express themselves in terms their external constituents understand and value in order to present their cases advantageously. In so doing, the members impose constraints upon their own perceptions of reality. As Burchell *et al.* (1980, p. 17) stated, control systems often become "... mechanisms around which interests are negotiated, counterclaims articulated, and political processes explicated." Consequently these authors recommended that budgeting be studied as a social and organizational phenomenon affecting organizational political processes rather than from within the traditional accounting perspective (see also Hopwood, 1978).

Building upon the Cohen & March (1974) "garbage can" model of management action, Cooper *et al.* (1981) criticized the notions of "rationality" and "objectivity" as misleading, and

argued that confusion over goals and the means to accomplish them dominates rational, planned actions in many social institutions. Key to their argument is the contention that strictures against imitation, coercion, legitimation and *de facto* rationalization gradually become relaxed, along with the inclination to act rationally. Organizations that face uncertain or ambiguous purposes and goals must nevertheless demonstrate to society the legitimacy of their existence, particularly in an environment of scarce resources. An appearance of rational action serves this purpose, and budgeting systems implemented by the organization and displayed for external constituents provide effective dramatizations of a commitment to efficiency and rationality. As Cooper *et al.* concluded:

Internal accounting systems, by *what* they measure, *how* they measure and *who* they report to, can effectively delimit the kind of issues addressed and the ways in which they are addressed. They reflect the status quo, the appropriate and acceptable ways of doing things and talking about issues (1981, p. 182).

With some shift in focus, Boland & Pondy (1983) found that the process of generating and evaluating budget forms continued in a university budget process even though there was no money to be allocated, serving as an important vehicle for defining and clarifying values. In a period of scarce resources Boland & Pondy (1983) further found that the symbolic importance of budget titles was heightened and that there was an increased use of accounting categories that had political appeal to legislators.

Similarly, Argyris (1977) called into question the uncritical acceptance of rationality in organizations. At the same time, he felt that the uncritical acceptance of the anarchistic or "garbage can" view of organizations can be misguided and contribute to organizational dysfunctions. Argyris (1977) suggested that control systems are inherently limited. The sheer information processing costs of a system necessary to minimize both misunderstandings by those controlled and injustices to those who control (in the sense that the complexity of what they do is not reflected by the control system), would be too high to permit the existence of such a system. As Argyris

stated:

[Controllees] who are responsible and loyal understand these constraints but, in doing so, place themselves in a dilemma. If they accept the high probability of injustice as necessary, then they have acted to legitimize injustice. If they do not accept the necessity of injustice, they would be seen as disloyal. Those at the upper level may find it necessary to defend themselves from the dilemma of having to be unjust in order to make the organization effective (1977, pp. 116–117).

Following Argyris' reasoning, it may be suggested that if neither party — controller or controllee — exploits the control system nor takes it too seriously, the dilemma will remain dormant and the budgetary pretenses of supporting rational discourse will go unquestioned. If, on the other hand, the controller exploits the system to reduce funding, then negative group dynamics such as defensiveness, closedness, and advocacy will result and the system will be attacked. Similarly, if controllees unilaterally question the budget system, they will be seen as disloyal and, again, dysfunctional group dynamics will result. Rather than accept the defeat imposed by this dilemma, however, Argyris urged that both controllers and controllees, not merely one party, address this inherent paradox by recognizing and directly confronting it.

Finally, Hopwood (1983) suggested that accounting derives much of its force from its blandness. To the extent that it seems to be trivial and dull, we take its ostensibly routine support of rationality for granted. The appearance of conforming to the accepted ways of doing things softens or hides any attendant coercion. The relevance of accounting appears to be self-evident, thus, its force and tenacity, and its ability to mask the existing power network, tend to go unsuspected. It provides a useful device for taking the debatable — like goals, strategies, the locus of control, and the reduction of funds by budgeters — out of the realm of the political and therefore beyond the realm of open debate. Accounting creates and imposes an apparent technical zone of control and calculation rather than a zone of political bargaining and conflict among interests. Thus, accounting comprises part of a myriad of forces that, in combination, constitute a conception of reality rather than merely reflect

it (see also Hopwood, 1984).

### *Control and the wider social context*

More broadly, Weber (1947, 1958) sought to understand the dependence of society on bureaucratic organizations that, in turn, serve as the base for the advancement of rationalization wherein efficiency and bureaucracy are seen as social values. Weber reasoned that rationalization is concerned not only with the long-term process of social structure transformation, but simultaneously and more importantly, the perpetuation of existing power relations concealed in the advancement of rational imperatives. He interpreted the issue of control as one that rests on rationality and calculability — the nexus that links the purposes of the modern institutions to the purposes of the state. Thus, rather than merely addressing the politics of budgeting, the critical issue is the politics of rationality itself (see also Brubaker, 1984).

Meyer & Rowan (1977) observed that traditional theories of control presume that control systems have succeeded and multiplied because they have helped make technical operations more efficient in a highly rational manner. By contrast, they suggested:

In modern societies, the elements of rationalized formal structure are deeply engrained in, and reflect, widespread understandings of social reality. Many of the positions, policies, programs and procedures of modern organizations are enforced by public opinion, by the views of important constituents, by knowledge legitimated through the educational system, by social prestige, by the laws, and by the definitions of negligence and prudence used by the courts. Such elements of formal structure are manifestations of powerful institutional rules which function as highly rationalized myths that are binding on particular organizations.

In modern societies, the myths generating formal organizational structure have two key properties. First, they are rationalized and impersonal prescriptions that identify various social purposes as technical ones and specify in a rulelike way the appropriate means to pursue these technical purposes rationally. Second, they are highly institutionalized and thus in some measure beyond the discretion of any individual participant or organization (1977, pp. 343–344).

In particular, Meyer & Rowan (see also Meyer, 1986) treated the use of such externally legitimate formal assessment criteria as budgeting as

examples of the social construction of organizational processes rather than as the rational reflection of technical operations. Accounting, in turn, should play a heightened though ritualistic role in such poorly structured settings as universities that are groping to find, conform to, and demonstrate for constituents, some form of rationality in order to gain legitimacy. Somewhat similar to Argyris (1977), they reasoned that social institutions can avoid massive dysfunction by essentially "decoupling" external image systems from backstage operating processes and relying on their members to act in good faith and not take the formal assessment criteria too seriously.

Drawing on Weber and extending Meyer & Rowan, DiMaggio & Powell (1983) sought to understand the processes underlying the tendency for organizations to become isomorphic in their use of such technically rational managerial practices as budgeting systems, observing:

[S]tructural change in organizations seems less and less driven by competition or by the need for efficiency. Instead, . . . bureaucratization and other forms of organizational change (such as the implementation of budgeting systems) occur as the result of processes that make organizations more similar without necessarily making them more efficient. Bureaucratization and other forms of homogenization emerge, we argue, out of the structuration (Giddens, 1979) of organizational fields. This process, in turn, is effected largely by the state and the professions, which have become the great rationalizers of the second half of the twentieth century . . . [H]ighly structured organizational fields provide a context in which individual efforts to deal rationally with uncertainty and constraint often lead, in the aggregate, to homogeneity in structure, culture, and output (1983, p. 147).

DiMaggio & Powell reasoned that this tendency toward bureaucratic isomorphism and the concomitant use of management practices which are infused with value beyond the technical requirements of the tasks at hand, are supported by three closely linked processes — coercive, mimetic and normative. Coercive isomorphism involves formal and informal pressures exercised on organizations by external constituents to adopt new bureaucratic practices which are similar to peer organizations. Often the implementation of such practices tends to be at

once ceremonial and pervasive within the organization, delimiting the mental sets brought to bear in solving problems and thereby constraining future actions. DiMaggio & Powell viewed budgeting as an example of coercive isomorphism that is often required by the State for organizations to be eligible for continued funding. Mimetic isomorphism is more passive in nature and arises in situations where input/output transformation is poorly understood, where goals are ambiguous, or where the environment creates an aura of uncertainty. Here, organizations model themselves after peers and use their performance criteria in part to demonstrate that even though there may exist an indeterminacy in what they are trying to achieve and how they are trying to achieve it, at least they are similar to peer organizations in many demonstrable ways. And finally, normative isomorphism involves the professionalization of the key workforce who aspire to define conditions and methods of their work to establish a common philosophical base and legitimate their own desired professional autonomy. Importantly for purposes of the current analysis, DiMaggio & Powell hypothesized:

The greater the extent to which organizations in a field transact with agencies of the State, the greater the extent of isomorphism in the field as a whole. (p. 156)

DiMaggio & Powell concluded that the image of society as consisting of tightly and rationally coupled institutions may be more myth than reality. Consistent with March & Simon (1958) and Simon (1957), they urged a focus on understanding the initiation and preservation of power relationships on two fronts: (1) the power to set premises and define the norms and standards that shape and channel behavior; and (2) the power to delimit appropriate models of bureaucratic structure and policy that go unquestioned for years.

Also on a societal level, Habermas (1971) reasoned that rationality involves making the "correct" choice among strategies, the appropriate application of technologies, and the efficient establishment of systems. In effect, Habermas defined rationality as a specific form of unacknowledged political domination, wherein or-

ganizational processes become synonymous with the institutionalization of existing power relations whose political character is unrecognized. He argued that the increasing significance of rationality makes the politician dependent upon the technical professional who invents rational schema for cloaking political processes in calculated and hence objective techniques. Such a position further suggests that the transformation from discourse within an explicit political context to a discourse around technique disguises state domination and portrays the state as providing a rational response to technical problems. Because the discourse of a budget is public, many claim that the budget process advances order, justice, equity and rationality as its guiding principles.

Giddens (1983) also has suggested that social rationality involves the collection, retention and control of information about persons, objects and events, and that this rationalization provides an authoritative base supporting the power needed to administer social institutional networks. In its most developed mode, this disciplinary form of power and surveillance involves individual organizations regulating their own processes according to certain norms (Foucault, 1979). The exercise of power is discreet, regular, and generalized without interruption; it does not enter the scene from the outside, but acts within the normal processes of production. The advantage of discipline as a form of control is not simply its thoroughness, but its establishment of institutionalized impersonal control. Control is objectified, arising to become a shared cultural value. The result is that the power relations of hierarchical authority become invisible.

*Society, organization and control: a two-directional flow*

These perspectives of budgeting in a political environment are not without their limitations. Both the organizational and social context perspectives hold their budgeting is complicit in the process by which the social flows through and changes the organization, thereby creating an organization's reality (Hopwood, 1983). Cohen, for one, recognized a paradox related to

this position:

The properties of the elements of social phenomena obtain many of their characteristics from the larger phenomena of which they are a part, while the larger entities obtain their characteristics mostly from the relations between the parts of which they are composed (1968, pp. 11-12).

Giddens (1979) went on to conclude that social theorists tend to emphasize either one side or the other of this paradox to the exclusion of the other. Similarly, Meyer (1984; see also Roberts & Scapens, 1985) argued that while organizational theorists have concluded that excessive rationality has been imputed to organizations, they should not fall into the same trap and impute excessive anarchy while ignoring any other significance of rationality. Meyer elaborated on the two sides of this paradox when he stated:

Realizing how politically motivated decisions may be adorned with rational trimmings should not blind one to ritualistic political ceremonies invoked to legitimize fundamentally rational decisions. The acknowledgement that some organizational symbols dramatically reflect historical events and sustain myths perpetuated by environmental actors should not obscure other symbols that are robust mechanisms generating commitment to future courses of action (1984, p. 16)

Extending this line of thought, it is not sufficient to merely argue that budgeting may be used as an expression of societal views that consequently change organizational practice. It must also follow that broad societal views must be reproduced by specific organizational practices for the practices to exist. Hackman (1985) seemed to identify the significance of this paradox as it pertains to budgeting in her study of power in university settings. Concluding that her study reinforces the findings that budgeting is a political exercise, she too argued that it is not sufficient merely to see budgeting rationality as an expression of societal values. Hackman posited that budgeting rationality is more than symbolic myth, that there is an inherent rationality which links social resources to the needs of the organization vis-a-vis the budget process. As Hackman argued:

The present study reinforces the conclusion of others (e.g., Wildavsky, 1979) that budgeting is a political exercise. At the same time, the analytical results suggest that



there may also be an inherent rationality in budgeting. . . Although there are efforts at some of the six institutions to extract rational justifications for budget requests . . . the budgeting rationality referred to here is something different from particular budgeting or planning techniques. The significant relation of environmental power to resource allocations suggests the possibility of a rational link between budget decisions and the needs of an institution, a link that may be stronger in times of financial stress (1985, pp. 74-75).

Herein lies a basis for our examination of budgeting. As described above, both aspects of the literature, organizational and societal, reason that control systems such as budgeting are vehicles by which societal expectations flow through and change organizational practice. Therefore it can be argued that if societal expectations prescribe technically rational organizational practices for continued support, then organizations will adopt these practices in order to receive continued support. But what if an organization elects *not* to adopt society's prescriptions? It is here that the specific organizational reproduction of expectations takes place. If an organization elects not to reproduce societal prescriptions, then societal expectations will change or the organization will not receive continued support.

### *Propositional recapitulation*

The reasoning set forth in the foregoing three subsections may be expressed as a series of propositions that are subsequently examined in the empirical portion of our study.

*Proposition 1.* The chief responsibilities of institutional administrators are to reaffirm and solidify ties with constituents through symbol management, consistent articulation of common vision, and interpretation of diverse actions in terms of common themes using agreed upon language (Weick, 1976).

*Proposition 2.* Control systems often become mechanisms through which interests are negotiated, counterclaims articulated, and political processes explicated (Wildavsky, 1964, 1975, 1979; Burchell, *et al.*, 1980).

*Proposition 3.* Budgeting systems, by specifying what they measure how they measure it and who they report to delimit the kinds of issues addressed, how they are discussed and the actions subsequently taken (Cooper, *et al.*, 1981).

*Proposition 4.* Reliance on control systems requires a balance between tolerating injustice as to their inability to

reflect complexity and loyalty to the institution by controllees; and between being unjust to controllees and making the overall social system productive by controllers. In part this is done by not pushing the control system to do too much, by not taking it too seriously (Argyris, 1977).

*Proposition 5.* The power of budgeting in making things appear to be rational, objective and nondebateable lies in its apparent state of being trivial, dull and self-evident (Hopwood, 1983). When the importance of budgeting in creating reality is accentuated, the technical zone of control, calculation and discourse is abandoned in favor of political bargaining, debate and conflict.

*Proposition 6.* At the level of the state, budgeting is complicit in perpetuating existing power relationships by concealing the political with rational imperatives (Weber, 1947, 1958; Brubaker, 1984; Habermas, 1971; Giddens, 1983).

*Proposition 7.* The adoption of formal organizational practices by social institutions is mandated by societal expectations, which identify social purposes as technical ones and specify in a rule-like way how these "technical" purposes may be pursued rationally. Controllees are expected to be loyal, act in good faith, and essentially decouple their activities from their external imagery (Meyer & Rowan, 1977).

*Proposition 8.* The bureaucratization of social institutions is driven: (1) by coercive pressures from the State, (coercive isomorphism); (2) by a tendency of organizations to imitate one another and use peer reference data to generate an image of rational behavior (mimetic isomorphism); and (3) by a reliance on professionals to invent a knowledge base which supports administrative choice (normative isomorphism). Key to understanding bureaucratic functioning is knowledge of: (1) the power to set premises and define norms and standards that shape and channel action; and (2) the power to delimit appropriate models of bureaucratic structure and policy that go unquestioned for years (DiMaggio & Powell, 1983).

*Proposition 9.* Institutionalized modes of control, such as budgeting systems, enable the state to transform political discourse to discourse on technique, thus disguising political value judgments as rational responses to technical problems in which order, justice, equity and rationality appear to dominate (Habermas, 1971). Although premises are set and power resides external to an institution, in part through the institutionalization of control, organizations appear to regulate their own internal processes in conformity with established norms (Giddens, 1983).

*Proposition 10.* Although budgeting may be used as an expression of societal expectations and consequently impacts organizational practice, these expectations must be reproduced by specific organizational practice (Giddens, 1979; Cohen, 1968). If these societal values are not reproduced, then expectations will be altered or the organization will not receive continued support.

## RESEARCH METHODS

The empirical portion of the study described here may be characterized as an historically informed field study. Evidence was gathered using a naturalistic, qualitative research method supplemented by an extensive analysis of archival records.<sup>1</sup> Addressing the role of the field study in management accounting research, Kaplan (1983, 1984, 1986) has emphasized the value of descriptive research directed toward building multiple theories of accounting which entails eliciting management perceptions and world views, and fitting those perceptions into an historical context (see also Hopwood, 1983 and Johnson, 1975). Generally speaking, those who use a qualitative methodology seek to preserve some of the complexity and integrity of the phenomenon under study, adopting the viewpoint and language of the subject in a largely inductive, descriptive and interpretive manner (Van Maanen, 1979b; and Kuhn, 1962). Typical of such studies, our analysis essentially involved (1) asking participants to describe the broad historical context of the university-state relationships, particularly as it related to budgeting; (2) eliciting the views and remembered experiences of participants concerning budget practices between the university and the state (3) analyzing how these experiences affected the organization and participants; (4) critically examining these experiences and perceptions in an interpretive manner; and (5) appraising these interpretations with the participants (Lauer, 1965; Sanders, 1982; Garfinkel, 1967; Glaser & Strauss, 1967; and Lazarfeld, 1972).

We examined several agencies related to the university-state budgetary process over a two year period. These agencies essentially form a network within which the budgetary actors strive to maintain balance by establishing some form of consensus and cooperation. We concluded that only a network analysis that spanned organizational boundaries could properly describe what happens in this domain of activity

(see Zald, 1970a, b). Such an analysis, we reasoned, would show the actors finding ways to obtain and allocate resources; to legitimize themselves by dramatizing a commitment to rationality and to deal with the external control by the state government. The emphasis of this analysis therefore centered on describing, unveiling, translating and otherwise coming to terms with the meaning attached to budgeting by the budgetary actors themselves (Garfinkel, 1967; Tomkins and Groves, 1983; Willmott, 1983; Van Maanen, 1979a, b; and Mintzberg, 1979).

We gathered our evidence by conducting in-depth interviews and performing archival analyses. During the first phase of the study, we told an initial group of high-level university administrators our interest in the university budgeting and state appropriation process. We then asked the administrators to describe the historical development of this process as well as direct us to the relevant archival evidence available both inside and outside of the university. These archival documents included working papers, budget submissions, and internal memoranda. The information in these documents included dollar amounts and categories of the budget at different stages of development as well as critical, and often long, narratives. In sequence, we also examined the working papers, internal memoranda, and formal response papers prepared by the various agencies of the State. This documentation was supplemented with a review of the history of the university and its related agencies, including the State itself.

In the next phase of our analysis, we conducted interviews with budgetary participants that spanned organizational boundaries. These participants included key university staff members across campuses in the system and members of the various state agencies. Those interviewed were either direct participants in the budget biennium in question or were close observers of the budget process as defined by direct budgetary participants. These interviews

<sup>1</sup> For an extended debate of naturalistic, qualitative methods in accounting, see Tomkins & Groves (1983), Abdel-khalik & Ajinka (1983), Morgan (1983) and Willmott (1983).

followed an interactive pattern moving back-and-forth from one agency to another to facilitate cross-validating and to generate further context-centered questions and interpretations. Then we examined the documentation once again, this time as it related to supporting the various advocacy positions the budgetary actors assumed. One important form of this documentation was the extensive newspaper coverage of the entire budgetary process — documentation that provided a useful outside perspective with which to formulate and interpret interview questions and the archival documents (see Allison, 1971, on the use of such data to study decision making in the Cuban missile crisis). Finally, the interpretations generated from the foregoing analyses were evaluated with the assistance of key budgetary actors to determine whether the manner in which we “bracketed the life experience of participants” (see for example, Van Maanen, 1979b) made sense to the budgetary actors themselves.

### ANALYSIS

This section presents the empirical portion of our study. The first two subsections relate to a review of the history and the traditional budget process. Subsections four and five describe the changes made in the budget process; subsection three represents the transitional period. Where appropriate, we have indicated which of the propositions listed in the foregoing propositional network are supported by evidence.

#### *History of rational administration in the State of Wisconsin*

The State of Wisconsin has strong roots in the “progressive tradition” as espoused by its turn-of-the-century political leader Robert M. LaFollette. The Progressive Movement, or the “New Liberalism” of the period, hinged on the concepts of rationality and social efficiency that paralleled or even mimicked the industrial engineering efficiency espoused by Frederick Taylor (Weinstein, 1968; Larson, 1977). The state sector developed administrative structures

that emphasized centralization, rational administration, and expert decision-making. In turn, accounting in general and budgeting in particular became increasingly integrated into the management of public sector agencies, ostensibly in order to gauge their efficiency (Covalesski & Aiken, 1986). This bureaucratization of organizational practice — both private and public — provided a conception of authority that employed both the “rationality of science” as a world view and the experts who generated this scientific knowledge. In essence, this progressive ethos created a demand for management science techniques (Propositions 6, 7 and 9).

Among the prominent pioneers in this turn-of-the-century approach to social engineering were many of the administrative leaders and social scientists at the University of Wisconsin. The University of Wisconsin explicitly promoted the progressive ideology of efficiency and expertise by positing the University as an apparatus of the state with which it could define, articulate and promote efficiency (Larson, 1977). This elusive “Wisconsin Idea” represented an alignment of university with state, characterized in some of the popular phrases of the time as “a university that runs a state,” “the expert on tap, not on top,” and “applying the scientific method to legislation” (Nesbit, 1973, p. 426, Proposition 8). The social engineering work of the university emphasized concentration of authority, cooperation and control in order to foster efficiency as a key objective in the system. The foundation for the role of the academics was simple enough — they were singularly ideologically neutral and possessed no vested interest nor aspirations of power and therefore could provide rational and objective guidance in administering the state (Proposition 5). Specifically, state politicians aided by academics sought reform through the removal of issues from the realm of politics and by providing technical solutions generated by experts (Nesbit, 1973, Proposition 9).

A progressive state government led by LaFollette embraced and promoted this university mission. Kolko (1963) suggested that LaFollette, perhaps to a greater degree than any other turn-of-the-century political leader, followed the cult

of expertise, science and rationality:

As Governor he exploited the combined talents of a great university, and let the political decision-making process increasingly fall into the hands of the presumably positivistic academics. By relying on the talents of the reform-minded professors at the University of Wisconsin, LaFollette felt that difficult issues could be resolved by simple reference to experts (1963, p. 213, Proposition 9).

A tremendous confidence in impersonal expertise took hold in Wisconsin, which invited science and management to solve the problems of government. For example, the founder of the Wisconsin Legislative Reference Service wrote

If any praise is due the Wisconsin laws, it is probably because of the appointive commissions, the nonpartisan spirit, the expert and the civil service law (McCarthy, 1912, p. 174).

In the same manner, LaFollette himself, asked rhetorically

How has it been possible that both the people of Wisconsin and the investors in public utilities have been so greatly benefited by this regulation? Simply, because the regulation is scientific (1919, p. 359).

In summary, the State of Wisconsin had developed a particularly strong tradition of applying technical expertise in the management of public resources. Consistent with this social framework from which rational imperatives dictated scientific management, the University of Wisconsin had always played a particularly significant role in designing the social structure linking the state and its agencies (Proposition 9). What appeared to dominate in the development of this ethos was normative isomorphism (DiMaggio & Powell, 1983). There seemed to be a desire to develop and then apply rational mechanisms to the administration of the system, thereby depoliticizing decision making. There also seemed to be a desire by experts to develop an independent knowledge base that could be applied to society's needs thereby gaining "professional" recognition and autonomy (Proposition 8). Importantly, the development of these management science techniques predominantly arose as a consequence of social invention rather than to reflect underlying economic reality (Proposition 7). It is now ironic and significant,

that the university, as a major state agency, wanted to remove itself from the very social framework it had such an instrumental and ideological role in creating.

### *Budgeting I: the traditional approach*

The University of Wisconsin System (UWS), consisting of thirteen campuses, resulted from a 1972 merger of two state supported university systems: the University of Wisconsin with campuses at Madison, Milwaukee and two other cities; and the Wisconsin State University system with campuses in nine towns. The merged system is the third largest in the country in terms of student enrollment, and the Madison campus is the fifth largest U.S. campus. The State of Wisconsin's financial support for higher education had traditionally been held well above the national average, especially when the relative wealth and size of the population are considered. For example, Wisconsin ranked seventeenth in personal income among 50 states and was eleventh in state appropriations for higher education in 1983.

The Governor's role in the biennial budget request process is prominent. The Governor selects from among the various state agencies (the UWS is one of them) budget requests and decides on those that will go forward to the legislature as a part of the Executive Budget Bill. The UWS submits its biennial budget request to the governor through the State Department of Administration (DOA). The DOA, backed by a team devoted full time to monitoring UWS, examines every item in these budgets and develops position papers and alternatives for the Governor to consider. The DOA also arranges for budget discussions and hearings involving the Governor and each state agency including UWS. On the Governor's behalf, the DOA presents the Executive Budget Bill to the legislature. Next, this Executive Budget Bill and supporting documents undergo a review by the Legislative Fiscal Bureau (LFB) working on behalf of the legislature. Once the legislature agrees on the terms of a biennial budget, the Governor must sign it.

Consistent with the Wisconsin tradition of

management science discourse and administration (Proposition 6), the State employed an "enrollment funding formula" to determine the resources needed to maintain the UWS relative to other agencies having vastly different missions (Proposition 8). It applied this formula to the areas of instruction, educational programs and libraries. One can gauge the importance and confidence that past Governors and legislatures attached to this process by these remarks from a DOA document:

The approach [the enrollment funding formula] offered several advantages to policy makers: (1) changes in program scale or nature were highlighted; (2) changes in workload were presented according to generally accepted, quantified standards; (3) the enrollment funding formula provided a methodology for assessing the long term effects of enrollment declines; (4) in an area where policy makers have traditionally assigned a great deal of discretion to the Regents in the allocation of funding, it was possible to avoid involvement with the detail of instructional funding decisions; and (5) the number and variety of individual program decisions brought to policy makers was minimized.

The dual concerns of making administrative decisions in a scientifically supportable manner and depersonalizing decision-making are readily apparent in the above document. This traditional, formula-driven budgetary process satisfied the State's preference for dealing with the UWS according to "generally accepted, quantified standards." It also supported the exercise of discretion in the UWS so as to "avoid involvement" with various specific funding decisions, thereby decoupling external assessment criteria from internal operating processes (Proposition 7). These two aspects suggest the dual nature of budgetary discourse itself: (1) espousing a rational basis from which to generate and allocate resources in a discreet, auto-regulatory fashion to the various agencies which is a particular need of the State (Propositions 6, 9) and (2) providing a symbolic basis to legitimate the resources given to a particular agency so that the State and the agency, such as UWS, could justify leaving discretion with the agency (Propositions, 1, 2, 5 and 7). There is a compatibility within the enrollment funding formula in that the State gets its rational, technical mechanism

with which to allocate resources to the UWS, and the UWS can symbolically justify its control of resources within the institution (see also Bolland & Pondy, 1983; DiMaggio & Powell, 1983; and Meyer, 1983).

A threat to this balance would emerge if this rational, external discourse penetrated the UWS and altered its internal processes (Proposition 7), thus making it isomorphic with other state agencies (Proposition 8). The balance also would be threatened if the symbolic, qualitative discourse rose to the level of questioning the provision of resources beyond merely assuring the self-administration of those resources received by the UWS from the State (Propositions 5, 7 and 9). It would seem that the UWS did not desire such penetration because of the loss of institutional and programmatic autonomy (Propositions 4 and 5). The State, in turn, had no particular desire to extend the rationality any further as long as the university continued to demonstrate a commitment to rationality in at least a symbolic mode while avoiding dysfunctional uses of social resources internally.

This historically rooted, state/university budgetary relationship gave the UWS a degree of comfort, even though it required the university to generate and share a great deal of detailed, quantitative information with the State (Lee & Bowen, 1975). The UWS administrators knew that the administrative burden of providing all this quantitative information might encourage the State to overstep the boundary between legislative and state prerogatives and take the budget submission literally and seriously. They also realized or hoped that the availability of such information in an open public arena kept the state from "unwarranted interference with administration" and perhaps served as a "necessary concomitant of an overall constructive relationship" (Lee & Bowen, 1975). As Feldman & March (1981) argued, organizational participants seem to find value in information that has no great decision relevance. The information symbolized a commitment to rational choice as well as personal and organizational competence. Further, Feldman & March indicated that this over-consumption behavior is more common in

situations where decision criteria are unclear, performance measures are vague, and it is public information; all traits of the state/university budgetary relationship.

Thus, the quantitative budget submissions were seen as mutually beneficial. The State could demonstrate that it was controlling the agency, while allowing the UWS to make the subjective and politically sensitive decisions about where the monies went within the system (both by programs and geographical regions). The State could, in short, "avoid involvement in instructional funding decisions." These mutually acceptable conditions prevailed, however, only before the recent state fiscal crisis; they prevailed, that is, when the UWS was generally well funded.

#### *Budget cuts and taking the budget seriously*

Over the last several years the State systematically reduced its level of support for higher education using the quantitative budget submissions. Two independent studies have assessed the changes in state funding over the past decade in Wisconsin.<sup>2</sup> The reaction to the revelations of the two studies as the State approached its 1983-85 budget biennium appeared in newspaper accounts like these:

Higher education in Wisconsin will require a return to the higher priority of the past. Additional state aid won't come from massive tax revenues fed by inflation; those days are gone. It will have to come from a shift in spending priorities by the Governor's office and the legislature. This means relatively less state aid in other areas (*Wisconsin State Journal of Madison*, 8 August 1982).

This has been a decade of broken promises in the form of the State's traditional enrollment funding formula which has been the basis of figuring state funding for Wisconsin's public universities since the 1950s. The formula is

supposed to set the amount of state tax money that goes into university coffers each year according to the number of students enrolled on university campuses. Since the two former state university systems were merged in 1972, however, the university has rarely seen the full funding that should have resulted. At the same time, the university has had to accept all qualified students. As a result, in 1981 — to cite only one example — the university should have received \$5.8 million more in a state tax money than it ended up getting. The traditional formula does not get at the root of the problem (*Capital Times of Madison*, 16 July 1982).

The funding problems of the UWS were exacerbated by enforced shifts in internal allocations that took place within the system. The merger of the two institutions reduced the ability of the "flagship" campus at Madison to maintain its status both in the system and with other universities. Grouped with other institutions in the state system, Madison became a major source from which increasingly scarce resources were to be allocated after the merger. The UWS began in essence to transfer funds from Madison's to other campuses in the system. Lee & Bowen (1975) suggested that these transfers occurred for at least two reasons: (1) widespread sentiment that the prestigious Madison Campus, as a part of a system, should help its "siblings" in difficulty; and (2) a political reality indicating that the state might find ways to take the funds away from the entire system if they were not all distributed voluntarily.

With the decreasing funding of the system as a whole, tensions mounted relating to the internal allocation of resources among campuses. For example, in 1982 departing State Governor Lee Dreyfus warned that the UWS would be forced to close some of its campuses by economic pressures if it wanted to remain one of the nation's top academic systems. As he said, "It is clear that

<sup>2</sup> The first, the Benchmark Model, compared the recent UWS funding levels with 1973 levels, the first budget year following the merger of the university system. Controlling for variations in staffing levels, library needs, and enrollment levels, and allowing for inflation, the Benchmark Model indicated that the UWS budget-base for teaching had been underfunded by \$54.6 million; moreover, the UW-Madison, the system's research campus, had been underfunded by \$13.9 million. A second study, the Instructional Funding Model, compared the UWS to other major public universities in the U.S. and, controlling for similar factors, found that the UWS has been underfunded \$148 million. This study also provided trend data that reinforced the conclusion that the level of support had declined since 1973; for example, the system now ranks 36th in support per student, compared to its ranking of 6th in 1973. The rate of increase in support of the system between 1972 and 1982 ranked 44th among all states. The proportion of Wisconsin's state budget going to higher education had decreased from 25 to 18% in the same period.

the University of Wisconsin will no longer be able to lead the nation if they decide to keep every institution. Preeminence of Madison must be absolutely maintained and not diluted." A strong countervailing public reaction to this position statement of priorities was reflected in this editorial (Proposition 5):

The University of Wisconsin is composed of thirteen full universities and thirteen two-year centers. These 26 facilities are scattered throughout Wisconsin and offer nearly the opportunity for all state residents who so desire to pursue post-secondary education while continuing to live at home. This easy access to advanced education is the strength, the backbone of the system — at least it should be. Dreyfus appears committed to fostering the academic reputation of the university's central campus at the expense of the rest of the State. That is elitism, and unfortunately such unnecessary (albeit perhaps desirable) status seeking comes at the expense of many Wisconsin residents who would thus be denied access to a college education (*Duluth Herald*, 30 November 1982).

In summary, the enrollment funding formula had served the budgetary process between the state and UWS in at least two specific ways: (1) it provided a rational appearing basis from which the State could allocate resources to the university; and (2) it gave the university an ability to administer the internal governance of these resources autonomously, thus decoupling internal operations from the external legitimization process that was the budget. In essence, the UWS reproduced the State's expectation as to rational administration of its system, as specifically embodied in its compliance with the enrollment funding formula (Proposition 10). But two sources of tension existed within this budgetary process. First, the State had imposed a significant decrease in funding over the entire system using the budget as a rationale. Second, the main research campus had been required to engage in subsidizing across the rest of the system. These tensions tipped the relatively balanced relationship within the budget formula in favor of the state. Although the UWS maintained discretion over the funds it received internally, the state legislators and Governors had "ratcheted down" support for the UWS, hiding its funding cuts, moreover, behind a facade of accounting techniques that provided a semblance of rational and

reasonable governance (Proposition 5). Not surprisingly, the historically progressive Madison campus began to question the fairness of and then to reject the traditional enrollment formula. With this rejection, or non-reproduction of the State's expectations, we would expect that disorder and change would ensue (Proposition 10).

### *Budgeting II: an attempt at a unilateral definition of budgetary reality*

The UWS's 1983–85 budget request reflected a major policy decision at the university to define a new budgeting context, if not a new budget process. The UWS unilaterally decided to eliminate any use of the enrollment funding formula in its budget requests and, instead, submit instructional workload and other funding requests in the form of specific, qualitative program categories — referred to as Decision Item Narratives (DINs). At least two critical events pertaining to the state and UWS appear to have precipitated this change, and both events were specifically addressed in the non-traditional budget request.

First, and returning back to the Progressive philosophy (Propositions 1 and 6), the university president placed an emphasis on statewide economic recovery and revitalization, proposing that the university play a major role in this recovery effort. As the revised budget request stated:

We would be seriously remiss if we did not make economic recovery and vitality major themes of this budget request. No issue is more central to public discussion than this one. Clearly much has been done by the university to foster this goal. Yet recent studies also identify critical gaps and show areas in which further contributions could be made if additional resources were available. Recognizing similar opportunities, other states have taken significant steps to fund additional university-based training and technology. It seems to us that the time has come for comparable initiatives in Wisconsin. Clearly it would be unreasonable to expect the university simply to meet these challenges from existing resources. This is something we do not feel we can appropriately ask our institutions and faculty to do. The specific recommendations responding most directly to this vital imperative are that we should (a) restore the budget for lab-based instructional equipment; (b) restore the quality and ex-

pand teaching capacities especially in rapid growth areas; and (c) the need to upgrade libraries for instruction and research also clearly pertain to economic development.

Second, the president explicitly recognized that his budgetary request closely followed and was premised on the revelations of the two major independent studies — the Benchmark Model and the Instructional Funding Model. As the budget summary stated:

The case for readressing the university deficit is so compelling that many have suggested this request should seek — despite the state's fiscal condition — a major portion of the funding that has been lost in the past decade. We have decided, within the context of the Funding Report's findings, to seek modest restoration of the cumulative deficit, concentrating on those dimensions which relate most closely to current priorities of the State and society.

The UWS strategy to weave its budget request around the themes of the university's ability to help the state in times of economic difficulties and documented reductions in state support seemed to draw a sympathetic response from the citizenry of Wisconsin. This sympathetic response is consistent with Salancik & Pfeffer's (1974) observation that universities will be relatively better off at the hands of state legislators and the citizenry to the extent the bases of power with the organization (i.e., the university's ability to help with economic recovery) more closely correspond to the relative importance of the criteria held by external organizations. The sympathy of the citizenry is reflected in two editorials.

For several years university officials have complained that the system is being shortchanged in financial support from the legislature. Of particular concern was funding according to a formula based on enrollment of full-time students originally drawn up by university administrators. Although a legislative council special study com-

mittee made suggestions as to easing the effect as some enrollments began to dwindle in the 1970s, it concluded that a formula approach for determining instructional funding should continue. An alternative funding committee of university chancellors and administrators undertook a study to find out what was wrong. They documented that the university public financial support has decreased considerably in the last decade and that it no longer compares favorably, not only with previous levels, but with those of other states and institutions (*Apleton Post Crescent*, 18 July 1982).

Politicians and leaders of the business and industrial community are increasingly worried that the state is facing a future of economic decline unless something is done to reverse a combination of downward pressures. The university is arguing that the way to economic health leads directly through the doors of the universities. Better financial treatment of the university would improve the ability of the universities to give technological and economic guidance. O'Neill and other faculty and administrative spokesmen will be hitting the road in coming weeks — and perhaps years — to tell the university story to any citizen that will listen (*Green Bay Tree Gazette*, 21 July 1982).

In an effort to create a new form of "scientific management" language, albeit a qualitative one, the needs of the UWS were essentially summarized in three budget categories, or DINs, that sought to describe in narrative terms what a legislator or Governor would be voting *against* if they failed to support the request.<sup>3</sup> At the same time these budget categories portrayed the UWS as a cohesive, responsible entity deserving of social resources (Proposition 1). The UWS augmented each DIN request with specific illustrations and thorough arguments derived from expressions of resource needs made by the deans of specific campuses and programs. Selected cases appeared in the DINs to document and legitimize further the system's budget request. The specific dollar amounts of specific case narratives were not, however, directly

<sup>3</sup> For example, DIN 1, "Modernization of Instruction, Laboratory and Other Specialized Equipment" requested \$8 million for the 1983–85 biennium, to replace obsolete instructional facilities. Without additional funding for laboratory and other specialized equipment, the DIN argued that students could not receive the experience necessary to fill complex and newly emerging roles in industry, commerce and government, or to profit fully from advanced education in the areas of microbiology, engineering, chemistry and computing sciences. DIN 2, "Student Demand for Professional Programs, Science, Mathematics and English," requested \$8.8 million for the 1983–85 biennium. It argued that additional course sections had to be added in such areas as engineering and technology, business, computer science, English, and mathematics, referring extensively to the Benchmark Model and the Instructional Funding Model. Finally, DIN 3, "Better Access to Library Resources, requested \$7.8 million in the 1983–85 biennium, arguing that the money would both help arrest the decline in the quality of library collections and help underwrite an integrated computerized library system.



linked with DINs to the supporting case narratives. Therefore, neither the external actors (the DOA, LFB, legislature, or Governor) nor internal actors (the campus chancellors and deans) could associate specific dollar amounts from the budget document to specific programs or campuses. While the UWS opened itself to increased legislative scrutiny and the threat of control over major program thrusts — i.e. DIN 1 vs DIN 2 vs DIN 3 — a scrutiny that the State would not have within an enrollment formula, the UWS sought to retain control over the allocation of the monies received within the DINs by eliminating a documentary trail. The total funding requested in the three DINs was \$24.6 million. Thus, the UWS seemed to be challenging the State. As one state budget analyst suggested:

There is a strong undertone that lawmakers do not like to get into prioritization of education. The university knows it and likes it that way. They took a risk by giving distinct categories. But they were willing to take the risk to get out from under the enrollment formula.

At this point, the distinction between the traditional, quantitatively expressed budget request and the symbolic, qualitatively based budget requests was felt at the State level. What appeared missing, at least from the State's viewpoint was a demonstrably legitimate rationale for developing an appropriation largely because the UWS's "needs" and "declining quality" were abstractions. On this point, one LFB analyst stated that the Bureau was prepared to require the supporting numbers within the DINs if the legislature so desired. As one state analyst remarked:

The State needs a rationale for the monies they send to the University. The dollars are generated independently of the rationale. When the university gives examples, it helps provide this rationale (Proposition 6).

The DINs were constructed in a general manner to ward off legislative scrutiny of specific parts of the budget in terms of specific programs and campus funding. As a UWS member observed:

Right now legislators basically move the funds to the university and let them handle the allocation. But the budget is becoming more intensive, more active legislation. There is a lot more concern now as to how funds here are being distributed. It's becoming political. Is my campus

getting enough? Legislators have interest in specific programs and campuses. It is an extension of the mentality of enrollment decline to be prepared to deal with decline by promoting selective decline (Proposition 2).

The increasing legislative involvement in the traditional budget is an interesting contradiction. As suggested earlier, the traditional budgetary relationship was thought to be constructive as long as the UWS could depend on an adequate amount of overall funding. Decreasing resources heightened the internal allocation tensions across the campuses, and in turn, the campus administrators appeal to their respective legislative representatives to pressure the "irresponsible" central administration of the UWS. Both sides were hurt by the process: the UWS was seen as something less than cohesive and fiscally responsible, and the legislators were dragged into a politically sensitive debate over allocating resources, an area where they would rather avoid responsibility.

The obfuscation of specific campus and program needs within the UWS DINs thus served the internal purpose of presenting a united front. It also mobilized the political energy of the respective parts of the system — the various campus chancellors. As one UWS administrator stated:

The university has to put up a united front if we have hope of getting this through. The president has to be able to go to various parts of the state and have the chancellors work on people. If you tell them too soon, no one is satisfied. Chancellors understand only their own problems, no one else's. Things would become very divided if each chancellor would work for only his own campus.

Similarly, one UWS advocate stated:

There is also the issue of what the Governor and DOA could sell to the LFB and legislature. We have to argue our needs in terms of lump sum dollars with references to a lot of campuses. We can't talk just in terms of Madison, because Madison has only seven legislative representatives. So, if needs aren't built around a lot of campuses, items will have trouble getting through. We have to show how it (the budget request) impacts all campuses.

The intendedly ambiguous discussion of resource needs in the DINs, however, was of concern to the Madison campus. The Madison campus saw itself as "driving" the system; thus, its share of resources should rise accordingly. But if the UWS budget request portrayed such a per-

ception as reality, the seven local legislative representatives might be their own allies. One Madison campus administrator described the process this way:

Regarding our submissions to system, we get no feedback as to where our requests go. We get general comments that there are no dollars. The system uses Madison's request ideas and then piggybacks. So we carry a lot of the responsibility to prepare (the DINs), but everyone gets something. The system purposefully keeps things vague. This resists internal arguments before it's in the oven. Because if it is decided here, the chancellor loses interest. So they keep the pie whole and worry about dividing it later. This keeps the chancellors fighting for all of it. If it were specifically identified ahead, the chancellors would go out and argue only for their own piece. So now we have the chancellors arguing for the whole thing. But this doesn't always work. Some chancellors save the fight for last (to get their share of the monies to be allocated). Some don't do anything because they feel the system will partial out a certain quantity later on.

In summary, the UWS submitted its 1983–85 biennium budget request in the form of qualitatively expressed categories of instructional effort in lieu of the traditional enrollment funding formula. Such a change was motivated by the UWS's desire to represent its cause better — a cause not adequately advocated by the traditional budget. The UWS supported each of the three major DIN categories described in its budget submission with narrative evidence on the status of various programs and campuses. But the DINs described were the smallest unit of analysis, not individual campuses nor programs, in terms of dollar amounts. Thus the system hoped that its narratives would mobilize the broad support of its chancellors for the overall system and contain the tendency for state representatives to provide support along strictly geographical lines. In offering this new type of analysis, the UWS administration also hoped to maintain discretion over the use of its funding, thus relying on an expected reluctance among politicians and state agencies to involve themselves in prioritizing educational programs. There was, however, some apprehension among Madison campus administrators because they believed that it was primarily their programs that justified the DINs and that without the explicit recognition of this fact in the DINs,

Madison may well continue to subsidize its siblings at its own expense.

### *The death of Budgeting II and the creation of Budgeting III*

The UWS budget requests were first submitted through, with and by the DOA — the Governor's budget policy agency. Despite the hopes of the UWS, the DOA simply chose not to recognize the three separate DIN categories. Instead, the DOA collapsed the requests stated in the DINs into one budget item titled "Improving University Education." This counter strategy amounted to a firm decision by the Governor and DOA not to engage in budgetary discourse with the UWS on its own terms. The State found great discomfort in having to choose from among such broad funding categories as "libraries" vs "educational programs" vs "equipment needs." The State simply refused to employ the DIN dialog — Budgeting II — when the UWS abandoned the enrollment funding formula — Budgeting I. The university removed the mask of rationality from Budgeting I, and now the State countered by removing the mask of rationality from Budgeting II. The budget process shifted to a third stage — Budgeting III — where resource needs would be discussed in terms of the broad category "Improving University Education." As one UWS administrator observed:

Philosophically the Governor didn't want to get into managing the university. So he didn't want to get into prioritization. This is essentially what the Governor and the DOA were saying. The DOA and Governor didn't want to cut out discrete categories as promised in the campaign. They preferred just to fund in general and not to have it said that the governor rejected particular university needs. "Improving University Education" is a title that ties in nicely with the governor's campaign promises. He didn't want to cut out discrete categories as promised in the campaign. So, he preferred just to fund in general and not be in a position to be said that the Governor rejected a particular constituency's needs.

Consistent with Meyer's (1983) observation that the symbolic may often be used to justify rational debate, the DOA expressed the problems with the UWS budget proposal in the following position:

There are two serious problems with funding decisions

based on the university's approach. First, academic program decisions are clearly and traditionally the province of the faculties, institutions, and Regents of the system, and the approval of program-specific decision items risks reducing this independence. Because of the need to preserve the integrity of the relationship between the system and the state, it would be better to view the program-specific requests submitted simply as appropriate expressions of priorities within an overall funding approach. Thus, the State will not be forced to prioritize amongst specific requests. Second, no funding methodology exists for 1983-85 as an alternative to the enrollment funding formula as the university is insistent on its qualitative categories. The data supports the conclusion that increased funding for instruction is needed in 1983-85. No consensus has emerged, however, about what funding methodology should be used in the future. . . . Formulas provide a quantifiable set of relationships for policy makers to use, thus reducing the need for individual program decisions and leaving maximum flexibility in the hands of the regents. Formulas also provide some assurance that the existing quality of instruction will be continued (Propositions 3, 5, and 7).

The antagonism between the DOA and the UWS at this point was summarized by a state budgetary analyst in the following terms:

The university did not share much with us ahead of time. They didn't have very good political sense. Their strategy of bringing out the institutional funding report, not sharing ahead of time, and wanting to eliminate the enrollment formula, wasn't cool. Our job is to take what they prepare and bring it as a set of recommendations to the Governor. Our university budget was packaged differently, but it was still the same. From the very beginning it was not clear how much money would be available. The only thing that was clear was that we could not have a degrading of the library. The first thing that made sense was to pull the university budget apart and put it into meaningful categories. It was our title "Improving University Education." This provides a coherent structure that (1) the Governor can defend to the legislature and (2) the university can endorse. We don't want the Governor and university fighting before the legislature. If we didn't structure it the way we did the university would not have gotten such a large amount.

Thus the DOA saw itself as necessarily involved with managing conflict through a re-reformation of the budget. One UWS administrator conceded some misjudgment on the university's part:

The Governor has a need to express support for the university. We may not have sensed quickly enough the reaction of the DOA and the governor. A lot occurred after we first drew up the budget request. The former

Governor was still in office when the budget was made up. When it finally got to the DOA, we were surprised at the strength of their feelings against the use of these categories. If we had just asked for \$23 million, that would have been fine with the Governor. But they still have to face the LFB. To some extent, the DOA reaction to the university budget proposal is in anticipation of the LFB position. The budget director of the DOA works with the Governor and pictures himself standing in front of the legislature to defend his position. Also, the LFB and legislators are the kind of decision makers who want to deal with a quantitative rationale. They want to avoid being in a position of appearing to be playing games with the university because the university has a great deal of respect throughout the State (Proposition 2).

Meanwhile, the LFB also issued a working paper that backed the Governor and the DOA's rejection of the DIN of the budget request form. The LFB was, however, much more antagonistic toward the UWS than the DOA. For example, the LFB argued, as one major problem, that "the university's capacity to redeploy resources to growing (and away from shrinking) academic disciplines has been limited or not fully utilized." Importantly the LFB threatened to involve itself directly in the UWS and to allocate the funding. No one knew whether the LFB intended to reallocate resources, or merely to force an acquiescence to the status quo. As with all good threats, no one knew if the LFB was bluffing. As the LFB working paper stated:

The principle of selecting specific programs in which to make investments is one that the legislature may wish to encourage, particularly as applied to the internal distribution of funding in the university.

The LFB also expressed annoyance with the alternatives they faced, with the fact that the quantitative enrollment formula had been revealed to a large audience as inadequate, and with the more qualitative DIN budget request. The LFB working paper phrased the annoyance this way:

Beyond the fiscal impact of any decision to eliminate the enrollment funding formula, there are several planning and policy concerns. In the area of planning, some device is necessary for assessing the programmatic implications of enrollment changes. To date, the enrollment funding formula has served this purpose. Without the formula relating the university's base budget to new requests or to workload, changes will become more complex and could alter the traditional role of the legislature by requiring more review at the campus or departmental level than

was previously undertaken. A short-term suspension of the formula would not necessarily change the respective roles of the legislature, the Governor, and the Board of Regents. However, if the current university request represents a precedent for the future budgeting, planning or management, the legislature may have to address the issue of the basis on which university instructional programs will be funded in the future so as to ensure that an appropriate database and budgeting practices are in place for the 1985-87 biennium!

The LFB's reluctance to abandon a quantitative approach to funding is portrayed in this remark from a state budget analyst:

The bulk of state monies are allocated to all other (excluding UWS) agencies on a formula basis. So there is pressure on the university to do this. They need a (quantitative, formula-driven) mechanism that has a life of its own.

The university, therefore, had upset the budget process by not behaving like other agencies, but rather by becoming a heretic (Cooper *et al.*, 1981; Propositions 4 and 5). Perhaps more importantly, the quantitative formula had indeed taken on a life of its own, serving to facilitate and disguise the decisions being made in a political arena by a political means. The university had attempted to curtail this life and unmask the process, or perhaps replace the state's mask with one of the university's own choosing. Essentially the university's reformulation of the budget had upset a balance of working relationships within the network of agencies as indicated by the reactions of the Governor, DOA and LFB (Rowan, 1982; see also Benson, 1977; Padgett, 1980). Pondy (1977) provided insight into this tension when he suggested that there is tremendous pressure on decision makers to defend their decisions against criticism, thus common quantitative measures of effectiveness that permit comparison and determine resource allocation among units provide a robust defense. Similarly, Hill & Mahoney (1978) stressed that there is a preference for incremental budgeting via a quantitative formula as opposed to comprehensive budgeting as brought forth by the university because bargaining over historical precedents is disruptive to the coalition. Thus, in the reformulation of the budget by the Governor and the DOA, the forces of coercive and mimetic

isomorphism are very much in evidence to rid the forces of disruption and restore balance in the coalition (Proposition 3).

Senate Bill 83, which represented the final action by the DOA on behalf of the Governor, recommended to fund 83.5% or approximately \$20.5 million of the system's request for "Improving University Education." This Bill *ostensibly* (to be discussed in more detail later) recognized the underfunding built into the enrollment funding formula, thus demonstrating to a wide audience that it was rejecting this old formula as a basis for funding. But the UWS' alternative, to fund specific requests on their own merits, also presented serious policy concerns. Consequently, program-specific, DIN funding was not sanctioned:

Specific allocations of the recommended funds are at the discretion of the board of regents. A total amount is provided for all items requested and the overall reduction from the university's request is not the result of decisions on individual items. It is expected that the funding will be used to the extent possible to address the priorities outlined in the regent's budget request. . . . From a policy perspective, it is clear that the Governor does not endorse the form of the university's budget request. (Department of Administration, *Executive Budget Policy Issue Paper*, State of Wisconsin, 1983-85 Biennial Budget.)

One can offer several explanations for how the DOA and Governor eventually arrived at a 83.5% figure. As one UWS administrator stated:

They were extremely ambiguous in terms of what they could afford. They crept into it very slowly as to where they were. They told us that they wanted to lump things together and fund part of it, a large part. Once the category was defined, we tried to find a way that helped them find a dollar amount that represented partial approval. We spent a lot of time trying to find a way to justify the dollars they could justify (to LFB) and what they felt they could give us. So they told us what they thought they could afford, and helped justify it. We didn't really push for more.

Then the UWS, the DOA and Governor began to work as collaborators. The interpretation from an observer at the LFB was:

The Governor did not accept the Benchmark model as a basis for funding. Therefore, the governor came to a judgment as to lump sum funding to invest in the university. This would signify an investment in the university to offset previous budget reductions. The climate was right and the amount was right on a judgmental basis. At the

same time it was not a commitment to any of the arguments the university made.

The state funding represented an amount that the UWS considered reasonable. To some, the strategy to disrupt the traditional quantitative approach to state funding in favor of the symbolic DIN categories proved successful. Indeed, the State was still compromising enough to provide some additional funding while backing off from the enrollment formula. In essence, the State, especially the LFB, was angry that the traditional budgetary relationship, which had generated both technical and symbolic forms of budgetary information had to be abandoned. A purely symbolic budget left the State with no quantitative, "objective" way to generate or really legitimate monies. The second reformulation of the budget to indicate a general support for "Improving University Education" gave the State an ability, and even a minor victory — to save face and deal with the UWS in an acceptably symbolic mode. The UWS received what it, the DOA, Governor and LFB perceived to be a reasonable amount of funding while maintaining (with some threat of future interference) its discretion over the allocation of its funds.

The Governor also included a separate \$1 million category entitled "Faculty Retention" to dramatize his commitment to helping the UWS. The media quickly identified this \$1 million budget item as the "Star Faculty Fund." Coupled with the monies for "Improving University Education," this new fund provided very visible evidence of the Governor's commitment to higher education, as reflected in the following:

The Governor recommends that the salary portions of a number of university DINs be handled separately as part of a state salary plan. However, the Governor recommends \$1 million to supplement salaries of faculty members in recognition of outstanding academic achievements, under the discretion of the university. The intention of this recommendation is to demonstrate the State's continuing commitment to the quality of higher education, and the central role of sustained faculty quality in this commitment (Department of Administration, *Executive Budget Policy Issue Paper*, State of Wisconsin [1983–85 Biennial Budget]).

*Eptilogue: a day late and a dollar short*

The economic reality within which the UWS

and State had lived had been traditionally defined using the accounting enrollment formula. The rules that had guided their requests for programs and pay, as well as governance, had been implicitly understood (Meyer & Rowan, 1977; DiMaggio & Powell, 1983). The roles were defined and the actors found comfort within this budgetary relationship. However the UWS then caused major disruption by changing the budgetary request process. They had broken the rules and caused discomfort, even embarrassment to the relevant political actors. However, what the UWS obviously did not anticipate was the intensity of negative reactions by budgeters and the fact that *all* rules of expected behavior which had been implicitly followed if not fully understood — including budgetary pay requests — were now open for re-definition.

While Budgeting III ran its course in the Fall and early Winter of 1983, and UWS developed its usual separate salary request budget to be presented in the Spring of 1983. Compensation requests had been traditionally handled in a separate budget track through the state system with the rest of state employees, such requests having to go through the Legislative Joint Committee on Employment Relations (JCOER) for recommendation to the Governor. By April of 1983, the UWS Biennial Working Group on Faculty Compensation for 1983–85 submitted its report to the president. The group's charge had been to examine the current status of faculty compensation, identify the issues and problems, and make recommendations for the UWS to consider as it developed its 1983–85 compensation proposals for the state government. According to this report:

The ability of the university to continue making a positive contribution to our state and its future is dependent upon attracting and retaining high quality faculty as well as maintaining their morale. Competition from private industry and other universities has greatly diminished the ability of the university to do this. In short, the compensation needs of the faculty of the university can no longer be ignored without adverse consequences to the well-being of the State of Wisconsin.

In June of 1983 the UWS requested that the Legislator's JCOER grant a compensation plan

for the forthcoming biennial budget worth \$22 million. This request represented over an 18% increase in compensation. In July of 1983 JCOER submitted its pay plan through the legislature and it was approved as state law. It called for a 0% increase in pay for the UWS employees in the first year and only 3.2% in the second year. The UWS immediately appealed to the JCOER to allow them to at least increase the faculty retention fund by another \$1 million through fee adjustments, and the JCOER approved this plan by a 5 to 3 vote. The Governor, however, vetoed the modification to the original JCOER proposal.

Thus, the million dollar "Star Faculty Fund," that had generated such a tremendous media appeal, turned out to be essentially *in lieu of*, not a *supplement to*, the \$22 million salary request! Nevertheless, the Governor had upheld his campaign promise, "Help is on the way to the University," by providing substantial and very visible funding for his "Improving University Education" category and by establishing the "Star Faculty Fund." As one UWS administrator observed, "[I]t was the faculty themselves that subsidized what *appeared* to be the Governor's rather generous support of the UWS." Indeed it appears that the Governor had finally beaten the UWS at the game of manipulating symbolic budget categories, ironically turning to his own advantage what the UWS had offered in lieu of the traditional budgetary mechanism.

The reaction by the president of the UWS was swift and explicit. As one newspaper reported

[The president] told the special regents meeting that the university is in a box of having its pay increases match other state agencies and not being able to present pay requests until late in the budget process after the operational budget is presented. At no time during the biennial budget process was there a chance to appear and to argue the case for faculty and staff salaries. Had we sought such a hearing, we would presumably have been told the request was premature. Yet when we finally do reach the merits of this critical portion of the budget, we are told the appeal is too late. This is a curious process indeed, and the claim that our request is untimely seems unfair. Earl (the governor) vetoed a legislative committee's proposal to allow the university to add another \$1 million appropriation for faculty retention pay increases. Earl said the main reason for his veto was to maintain equity among all state employees. Earl asked for a task force to

study faculty pay (*Green Bay Press Gazette*, 24 July 1983).

One UWS administrator stated:

They (the DOA and Governor) knew that the pay issue was already in this 83% amount (the funding for university programs). So when the State gave 83%, the State was saying that this is for everything, including pay. Earl left the meeting thinking that salary was just not a top priority for the university. But O'Neil [the president] had always thought salaries were handled separately. So, in this discussion, it was never made clear how salaries were to be handled. We didn't think that there would be a zero package. We knew it would be bad, but not zero. We just kept moving forward on the budget. It didn't look strange that the pay plan was coming in late. In the Spring when the Governor said "Where were you?" it didn't make sense. Historically there has always been two tracks — programs and pay.

But the Governor remained unsympathetic; he felt that the UWS had plenty of time to express its needs for faculty compensation well before the Spring. As another newspaper observed editorially:

It may have made some difference had the university very early in the budget deliberations indicated that they felt the faculty compensation was a critical part of the university's budget. The fact is clear that when they finally did make a statement, it was a day late and a dollar short (*Badger Herald* of University of Wisconsin-Madison, 16 January 1984).

## CONCLUDING REMARKS

Based upon its usefulness in understanding the dynamics of the state/university budgetary process, we find considerable merit in the emergent perspective of budgeting. In brief, we argued that accounting may be more of a social invention complicit in the construction of a social reality, than a "rational" reflection of a technical reality. In this guise, a thesis was developed of *why* accounting may come to be in a particular setting and of *how* it may be shaped, altered and impacted upon by various institutional and societal forces. In our empirical analysis, we sought to emphasize the *why* and the *how* of budgeting rather than the more usual *what* that would involve considerable detailed description. We believe this emphasis is quite consistent with Burchell *et al.*'s (1980) call for the de-

velopment of theories of rather than *in* accounting. In arguing that accounting is in part constitutive of reality, the emergent perspective suggests that it is not enough to study what is accounting practice and then to better match it with reality; analogously, accounting and social reality are codeterminants of one another, and to study one element of the relationships would deny, even suppress the mutual dependence upon a network of elements. From such a perspective, historically informed case studies employing qualitative, naturalistic research methods can offer considerable promise for future research.

The emergent perspective, however, is also not without its limitations. The first of two general problems we see concerns the general form of its argument — that of larger social phenomena shaping specific elements of more narrow practice. More specifically, social expectations as to rationality flow through and pervasively alter aspects of organizational practice (Proposition 7, 8 and 9). Here, accounting is viewed as a device for demonstrating a commitment to a technical rationality to external constituents (Proposition 1) in what are essentially political processes (Propositions 2 and 5). It is suggested that accounting contributes forms of normative isomorphic pressures that may encourage organizations to be more alike without necessarily making them better (Proposition 8). As a consequence of this conclusion, the emergent perspective might be criticized for not serving a functional role for organizations. We believe that such a critique arises because the second side of the paradox alluded to by Cohen (1968) and Giddens (1979) is largely unrecog-

nized. That is, not only does the “general” condition the “specific,” but also specific organizational practice must embody and reproduce societal expectations in order for these expectations to exist and persist (Proposition 10). This contention suggests things can be effectively altered as a consequence of knowledge gained through reference to the emergent perspective.

A second general problem involves the theoretical work implied by the emergent perspective. To begin with, the theme of general, social forces influencing specific, organizational practices is inherently problematic to examine empirically. Because of the long time frame involved (in our case, 80 years), the myriad of subtle, complex forces implied, such as embodied by the expectations of the Governor, DOA, LFB and Legislature, and the difficulty in deciding at what point to examine the social construction of reality, the threat of multiple forces influencing budgetary practice is hard to assess (Cook & Campbell, 1976).

It is here that the second phase of Giddens' (1979) paradox may be of use. Once more, societal expectations do not, and cannot exist independently, but rather must continuously be embodied and in turn reproduced by specific organizational practice (Proposition 10). It is when these societal expectations are not reproduced that meaningful research may be conducted. In such circumstances, changes are seen in a very short period of time. The forces exerted are far from subtle. And the dominance of a few forces from among the many was readily observable. Thus, we found both sides of Giddens' paradox highly useful in exploring the implications of the emergent perspective.

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## CONTROL AND ORGANIZATIONAL ORDER\*

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### Abstract

This paper presents a broader conception of control, exploring its role within pluralistic organization. Reconceptualization is necessary because conventional authoritative and consensual versions of the managerial control model fail to take account of autonomous activity. An alternative conception, regarding controlling as causing and attributing control to all sources of stability and change, is needed to recognize that forces other than senior management can and do shape organizational order. Control is not management's prerogative; organizations are also self-governed through the assumptions, principles and rules underlying their beliefs and behaviours. Control is, thus, a non-cybernetic system encompassing both managerial and autonomous activity. Repositioning the conventional model within a pluralistic framework provides an understanding of why conceptualizing control as the cybernetic implementation of management's intentions has often obscured rather than illuminated the concept.

Organizational order can be defined as the sustained pattern of behaviours and beliefs which characterize an organization and mould its accomplishments. Conventional thinking about order has been dominated by two concepts: strategy and cybernetics. As management's definition of what the organization is and what it should be doing, strategy articulates, shapes, and justifies the context of organizational activity for all concerned. This activity is then regulated cybernetically, that is, through goal-related feedback and adjustment.

These concepts — organizational order, strategy, and cybernetics — are based on a particular view of organizations. According to this view, management controls the organization from outside, setting the thermostat as it were, observing results, and resetting as necessary. Organizational order is thus seen as the creation of management, strategy and cybernetics as the tools it uses.

But tangential to this conventional viewpoint is an ever-increasing body of research urging the recognition of organizational order as something other than the creation of management. According to this alternative perspective, organizations are arenas wherein a variety of stakeholders (be they managers, employees, shareholders, government, etc.) interact as they attempt to satisfy their various individual wants. The resulting order is not the deliberate creation of one actor but rather evolves from the collectivity of interactions.

The literature contains a number of variously articulated models which coalesce in the notion of autonomous activity. Its authors view strategy as being what the organization actually does, not what management intends it to do (Mintzberg, 1978). They acknowledge the relevance of activities which are unknown to management, to which management is indifferent, or which management is incapable of opposing. Various labels

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have been used to refer to these activities: autonomous (Burgelman, 1983); emergent (Mintzberg & Waters, 1985); self-organizing (Hedberg *et al.*, 1976); self-regulating (Dunbar, 1981); anarchical (Cohen *et al.*, 1972); cultural (Weick, 1985; Ouchi & Price, 1978); and political (Pfeffer & Salancik, 1974; Pettigrew, 1977; Bower, 1979). But whatever label is used, each of these theorists concludes that because of autonomous activity, order is not shaped in the way the managerial-control model would suggest.

This paper endorses and advances this position. It rejects the argument that autonomous activity is nothing but another label for goal-incongruent behavior best eradicated by the control system. It rejects the classification of autonomous activity as deviant, anomalous, or pathological, and challenges its relegation to the pool of unexplained and inconsequential variances. The evidence that autonomous processes are significant determinants of organizational order and outcomes is continually growing and it is persuasive.

The thesis of the discussion presented here is that forces other than senior management can and do play a role in shaping organizational order, and that appropriate reflection of this fact requires a new conception of control. Controlling, in essence, is causing to happen (Boland, 1979). It is the process of creating, sustaining and changing organizational order. Its attribution, therefore, depends on what actually happens: rather than being assigned unwaveringly to management, it belongs to whatever and/or whoever is the actual cause of belief, behaviour and outcomes. Leaving aside the assumption that control is a managerial process only and associating it instead with outcomes (Olsen, 1970) will open analysis to the true sources of organizational order.

Such causal analysis accommodates the narrow view (that organizations are only managerially-directed functional systems) but it also transcends the biases and limitations inherent in that perspective. It recognizes that organizations, as networks of interacting stakeholders pursuing individual interests, are also self-

governed systems. Within this more general framework, the aim of theory is to explain the respective roles played by managed and autonomous activities in shaping order. As will be seen, this approach aids in viewing management accounting as an organizational phenomenon (Hopwood, 1978; Hayes, 1980, 1983; Otley & Berry, 1980; Birnberg *et al.*, 1983) and has the potential to provide the empirical grounding needed to yield the theory the field so sorely requires (Hofstede, 1978).

### THE CONVENTIONAL MANAGERIAL CONTROL MODEL

Two variations of the managerial control model — the authoritative and the consensual — now dominate the control literature. Both presume that organizations are coherently articulated systems oriented to functional accomplishment, and both are based on the assumptions of strategy and cybernetic adjustment. Neither fully captures the complexity of the autonomous dimensions of organizational order.

The authoritative version assumes first that control involves the exercise of authority in order to achieve compliance (Etzioni, 1961) and, secondly, that management, whether it is totally self-centered or socially responsible to stakeholder expectations (Freeman, 1984), is the dominant controlling force. The particular techniques used in controlling will vary depending on the authority-diminishing effects of ambiguity and leader-follower conflict (Lorange *et al.*, 1986). Nevertheless, the model retains its essence: strategy expresses management's expectations which in turn serve as the reference point for cybernetic control (Horovitz, 1979; Euske, 1984; Merchant, 1985; Maciariello, 1984).

In contrast with this, the consensual approach (Tannenbaum, 1968) views control more as a property inherent in interdependent social relationships than as a unidirectional imposition of authority. Since control must be accepted to be effective, it involves a two-way relationship: the

person in control depends on those controlled to recognize authority. Consensus thus replaces compliance as the organizational ideal and control is seen as a multilateral negotiated process of establishing and achieving mutually acceptable expectations. In place of the authoritative (i.e. zero sum) view, conflict is now resolved by building consensus through such means as participative management (Bourgeois & Brodwin, 1984) or unifying cultures (Ouchi & Price, 1978). This process expands control in the sense that it shares it among more participants. But while it emphasizes the sharing of control and the desirability of building a consensual organization, this approach still assumes that organizations are purposive systems characterized by legitimate expectations and adaptive responses, i.e. that they are based on strategy and cybernetics. The essential difference between the consensual and authoritative versions lies in the mode by which expectations are arrived at, i.e. mutually agreed upon or managerially imposed.

Using the assumptions of the managerial model, we can construct a matrix (Fig. 1) which depicts four possible situations. Along one dimension, control is shown as either a unilateral or multilateral process, i.e. based on managerially-imposed or mutually-agreed-upon expectations. Along the other dimension, the presumed nature of organization is depicted as either conflictive or consensual. Thus, the grid depicts four possible organizational situations.

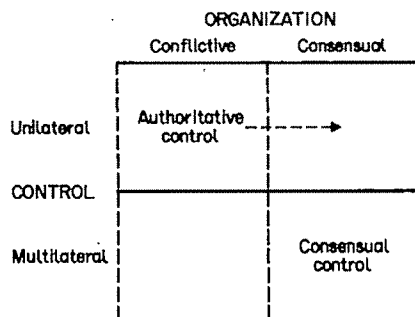


Fig. 1. Organizational situations and control processes.

The authoritative approach (emphasizing the unilateral control of the conflictive organization) and the consensual approach (emphasizing the multilateral control of the consensual organization) appear in diagonally opposite quadrants. But because the creation of a consensual organization is the objective of any management system, the authoritative approach also applies to the unilateral-consensual quadrant. The traditional control model thus encompasses three of the four quadrants. But as the diagram clearly indicates, it omits the fourth: the question of control in the multilateral conflictive situation is ignored because the strategic and cybernetic assumptions of the managerial control model are no longer applicable.

The conventional model views conflict as a temporary aberration to be ironed out by appropriate control practices. This assumption presents no problem so long as effective unilateral control exists (the top left-hand cell). But when conflict occurs in the absence of sufficient knowledge and power to exercise unilateral control, (the bottom left quadrant), the model provides no guidance. In assuming that conflict is deviant and temporary, instead of a legitimate fact of existence, it ignores a large portion of reality.

It is precisely in these situations that autonomous (i.e. independent self-governing) activity is most likely to occur. But, then, what does "control" mean? To whom or to what should it be attributed? Is it a sequential or simultaneous process, exercised over or with (Boland, 1979)? The ever-increasing recognition of the existence of autonomous processes continually raises these questions, but managerial control theory provides no answer.

In fact, since the term "control" tends to lead to the notion of "controller", i.e. a single outside locus, the word itself may account for our inability or unwillingness to grant legitimate status to autonomous activity. By encouraging a focus on the activities of one particular source, it diverts attention from activities originated elsewhere, activities that may have equal or greater effects on organizational order.

### AUTONOMOUS PROCESSES

The autonomous activity engaged in by stakeholders is their solution to the contradictions which they perceive between management's strategy and actual conditions. It is made up of independent initiatives and self-regulating processing which produce patterns of activity and belief (Weick, 1979) unanticipated by management. In some cases such patterns are goal congruent; in others, no fit exists between them and the strategy articulated by management. Although we know relatively little about the conduct and implications of such activity, increasingly researchers are suggesting that its sanctioned or unsanctioned dimensions may involve important (albeit somewhat difficult to interpret) aspects of an organization's order (Narayanan & Fahey, 1982; MacMillan & Guth, 1985).

The literature of strategic management, organizational behaviour, management accounting and decision theory is rich in allusions to the existence of autonomous processes. The extreme position is that outcomes are completely uninfluenced and totally uncontrolled by management. An autonomous situation, i.e. one which is self-governed, implies a senior management capable only of acting as a participant in an ongoing process. Such situations are described in the organized anarchy model of Cohen *et al.* (1972), the self-designing organizations of Hedberg *et al.* (1976), Starbuck & Hedberg (1977) and Hedberg & Jonsson (1978), the emergent processes of Mintzberg & Waters (1985), the autonomous activities described by Burgelman (1983), the influences of culture by Weick (1985), the negotiated outcomes of Murray (1978), the pluralistically determined coalitions of Cyert & March (1963), the external control of Pfeffer & Salancik (1978) and the ecologically-determined fates of Hannan & Freeman (1984).

Less extreme positions, alluding to the partial deterioration of managerial control, also pervade the literature. These emphasize situations wherein management is required to make decisions with inadequate information and to implement actions with inadequate power (Landau &

Stout, 1979). Activities in such situations tend to proceed incrementally (Lindblom, 1979) thereby providing opportunities for influencing choices and changing plans as they are being implemented. Limitations on management's ability to decide and act in ambiguous situations, i.e. with inadequate knowledge, are reflected in the notions of bounded rationality (Simon, 1976), enactment (Weick, 1977), action preceding rationality and justification (Weick, 1979), discontinuity and surprise (Ansoff, 1982), and incrementalism (Lindblom, 1979). Constraints on managerial control imposed by insufficient authority are reflected in the notions of logical incrementalism (Wrapp, 1967; Quinn, 1978, 1977), politically-based models (Macmillan & Jones, 1986), and behaviourally-based interventions (Bourgeois & Brodwin, 1984). Taken collectively, these models reveal many of the limitations imposed on management by an ambiguous environment and/or an insufficiency of power. They imply a management at least partially, yet significantly, incapable of controlling organizational evolution.

The conclusion to be drawn from this literature is that organizations contain both managerially and autonomously generated activity and that order is the result of some mix of the two.

### *Conceptual implications*

Acknowledging the existence of autonomous processes leads us to reconsider two aspects of the way in which we think about control. First, as the diagram in Fig. 1 suggests, autonomous activities falls outside the scope of the two traditionally dominant variations of the managerial control model — authoritative and consensual — because neither addresses the situation in which autonomous processes are most likely to arise. This suggests the need for a concept of control which is decidedly broader than that associated with the conventional model. Control must therefore be redefined as that which causes activities and outcomes to happen, i.e. it must be associated with causality (Boland, 1979), order and outcomes (Olsen, 1970), not with management.

Such a causal perspective, in turn, requires a

broader view of organization, a view which recognizes interdependent yet conflicting stakeholders, and which conceptualizes organization as a socio-political network (Benson, 1975, 1977; Denhardt, 1971; March, 1962) of stakeholder interrelationships reflecting mutual expectations expressed in roles (Vickers, 1956). In this more general, pluralistic framework, the character of the relationships, rather than some pre-supposed design, dictates the specific model of control which should be applied (Mason & Mitroff, 1983), with the managerial being only one possibility. Broadening the model of organization in this way explicitly recognizes that forces other than senior management can and do shape organizational evolution. New ways of viewing organizational and individual behavior may provide a more appropriate foundation for the development of accounting theory (Dyckman, 1981; Cooper *et al.*, 1981; Wildavsky, 1978). For rather than being limited by the conventional model and its presumptions, a general theory of control must explain the effects of chance events and autonomous as well as managerial activities on the dynamic fluidity of an ever-changing social system. This requires the recognition that an organization, given its full socio-political richness, is susceptible to change in an infinity of ways because it can, theoretically, be affected to some extent by any stakeholder who chooses to do so. Union organizers, citizen advocates, and governmental interventionists, for example, are all relevant players, often excluded by traditional control models.

To reflect these potential influences organizational control theory must make use of the work of social scientists now ignored or excluded. For example, Pfeffer & Salancik (1978) emphasize the differences among organizational participants, viewing organizations as markets for power and influence. Cummings (1977) regards the organization as an arena within which participants can engage in behaviour they perceive as instrumental to their personal goals. Weick (1979) draws attention to the cognitive dimensions of organizations and emphasizes that organizational order has epistemological and preferential dimensions (i.e. that it is affected by the proces-

ses by which participants make sense out of the world and through which they form and exercise their choices) as well as cybernetic aspects (Boujon *et al.*, 1977). Such cognitive and/or political models view organizations as non goal-oriented, non-instrumental social systems, emeshed in broader socio-political contexts. They emphasize that organizational outcomes are the result of successive iterations (Hannan & Freeman, 1984; Quinn, 1981). Hence, managerial decisions are not immutable choices but are part of ongoing processes which continually change as minds are changed and events proceed (Cohen *et al.*, 1972; Hedberg & Jonsson, 1978; Burgelman, 1983). Effectiveness is no longer goal-related but can be evaluated only in terms of organizational cohesiveness, adaptability and, ultimately, survival.

A thesis of this paper, therefore, is that the inclusion of autonomous activities within the sphere of control theory requires augmenting the functional achievement model of organization with one which helps to attribute causality. If control is to have a theory capable of explaining and predicting organizational behaviour and outcomes, a pluralistic governance model of organization capable of confronting issues of differential cognition and conflict is required.

#### A MODEL OF PLURALISTIC ORGANIZATION

Any sustained organization of human beings, whether it be a business or a nation, will have a governance system that contains four essential elements: leadership (management), citizenship (stakeholders), institutions (formal and informal patterns of relating), and ideologies (patterns of belief). No model of control will be effective if it does not explicitly recognize these elements, grant them appropriate attention, and evaluate their respective roles in creating, sustaining and changing organizational order.

The traditional control model as we have seen has focussed attention almost exclusively on only one of these elements — management. To the extent that ideologies and institutions have been considered, it has largely been from man-

agement's perspective: only management's beliefs have been granted legitimacy, only those institutions, often formal, preferred by management are stressed. That there are stakeholders has certainly been recognized but they have often been seen as peripheral problems to be dealt with rather than as active and legitimate participants. This narrow perspective has discouraged the asking of appropriate questions (e.g. who are the stakeholders, what are their characteristics, what are their various beliefs, what methods do they use, etc.), and that in turn has prevented the discovery of answers.

It is a perspective based on a view of organization as a "tool" (Perrow, 1972), oriented to functional accomplishment, and of management as the prime causal agent. Other considerations, such as the resolution of conflicting stakeholder expectations, are viewed as constraints inhibiting functional accomplishments. Autonomous activity just messes things up!

The pluralistic governance model presented here is broad enough to encompass both managerial and autonomous activity. It views organizations not as "tools" but as networks of inter-related, politically-motivated, conflicting groups (Bacharach & Lawler, 1980). It does not reject the validity of the managerial control model but regards it instead as one possible alternative, suspending judgement until it is proven valid. Its appropriateness will depend on the state of managerial authority which is not a given but remains as a perpetually open issue. Concern with authority is therefore broadened to include its acquisition and the political dimensions of its exercise. The model acknowledges, for example, that activities concerned with acquiring, exercising and retaining authority may be unrelated or even run counter to the ostensible purposes of the organization. In an ambiguous and politicized world, certain authority granting stakeholders may have special expectations and management, concerned with retaining authority, may engage in activities aimed at serving this stakeholder subset (Scott *et al.*, 1981).

Management's authority depends on the political role played by other stakeholders. But, because every action is evaluated as an exercise or

defense of authority (Wildavsky, 1966; Cyert & March, 1963), each managerial action affects the authority granted for future activity. Authority may increase if activities and results are evaluated favourably. Stakeholders presumably are then willing to trust management by suspending judgement and postponing evaluation (Scott *et al.*, 1981). But the opposite can also be true. Unfavourable evaluations can motivate stakeholders to undermine managerial authority and, thereby, detrimentally affect future conduct and performance.

The pluralistic model acknowledges that a single, universal set of criteria may be proposed by management to shape organizational order but does not rule out the possibility that different versions of this order may exist in the minds of other organizational participants. Although senior executives may attempt to formulate and implement their vision of the future, actual activity is a composite reflection of the multiple visions held by conflicting stakeholders. The objectives and constraints of these interest groups enlarge the range and complexity of mutually-accepted solutions as well as the processes by which they are achieved. Actual outcomes reflect the resolution of a set of interdependencies over some time interval, affect the satisfaction levels of stakeholders, and provide the capability with which to address the future. By relaxing assumptions of managerial authority and unitary purpose, the necessity of a single senior management-oriented rationality gives way to the possibility of multiple rationalities whose continuing activities constitute a pluralistic system (Dermer & Lucas, 1986). Purposeful evolution, guided by shared objectives, gives way to the possibility of opportunistic thrusts executed independently as situations allow (Burgelman, 1983). Hence, the organizational order of a pluralistic organization is decidedly different from that of one which is presumed to be managerially controlled.

Relaxing assumptions of managerial authority and unitary purpose makes two other assumptions questionable, namely that managerial strategy defines organizational order and that there is a clear distinction between the proces-



ses of formulating and implementing strategies, the former task being assigned to managers and the latter to the organization. In an ambiguous and politicized world the actual efficacy of authority is often far less than presumed. Stakeholders responsible for strategy implementation, who have nominally accepted management's authority, may actually disagree with the goals chosen and/or the methods employed to achieve those goals (Halal, 1984). Involving them so as to build the original commitment necessary for beginning the process of implementation may cause management to lose some control over intentions. Moreover, stakeholders have further opportunities for changing outcomes during implementation. Recent research (Mintzberg, 1978; Hall & Saias, 1980; Burgelman, 1983) has challenged the traditional model of formulation and implementation (Chandler, 1962; Anthony, 1965) suggesting that the process is often opposite to that commonly assumed, or at least, is interactive. The term "strategy formation" has been coined to encompass both formulation and implementation (Mintzberg & Waters 1985).

The point continually emphasized by the pluralistic governance model is that regardless of the particular type of organization, stakeholder relationships comprise a significant part of the fabric of control. In keeping with democratic ideals and the increasing advocacy inherent in our culture, and in contrast with conventional views (e.g. MacMillan & Jones, 1986; Freeman, 1984), the model regards stakeholder interests as objectives rather than constraints. Although stakeholder roles and relationships may differ by type of organization, this theme prevails. For example, in democratic societies, elected governments perceive voters as authority delegators as well as recipients of service. Cooperative organizations have a similar object but limit their milieu to designated members, differentiating these from the remainder of society. Private and independent social service and social action organizations are enfranchised by pools of shareholders or members, with management, workers, and service recipients being other stakeholders. Yet in each of these organizations, the efficacy of authority is an empirical question.

Hence the issue challenging theorists is the same — to identify the locus of control of the organizational order.

## THE CONTROL OF ORGANIZATIONAL ORDER

The system that controls — or shapes — organizational order is thus comprised partially of managerially-imposed regulations and partially of the self-regulatory activities referred to earlier under the rubric of autonomous activity. It is a system that provides for both functional accomplishment and the well-being of constituent stakeholders. The key point to keep in mind is that, although legal requirements necessitate codifying many activities, e.g. procedures for formulating and implementing strategy, for many if not most organizations their complete control system includes a set of regulatory activities which may or may not be documented. Such activities are the product of agreements negotiated by a variety of organizational groups, rather than of senior management alone (Strauss, 1978; Wildavsky, 1966; Cyert & March, 1963).

This system guides participants' interactions so as to yield sufficient perceived equity to maintain stability. Recognizing organization as being a pluralistically-determined order presumes that the processes of justification, negotiation and confrontation are conducted in the absence of any single overarching rationality. Cooperation sufficient to permit a commonality of action replaces goal attainment as the minimum requirement for organizational order. Fit now implies an accommodation among interest groups as well as the matching of organization to environment advocated by contingency theory. An emphasis on cohesion thus gives way to the recognition that the various parts of an organization are likely to move in independent spurts, individually disjointed, but somehow culminating in recognizable order (Weick, 1979).

The autonomous side of organizational control is most significant when external and internal forces constrain what management can and cannot do. Pressure for democratization is one

such force. Many organizations, including those privately owned, are gravitating at different rates toward pluralism. The impetus is from claimants, i.e. unrecognized and illegitimate stakeholders who are increasingly pressing for recognition. Also, managerial authority is now being challenged even by the stakeholders who originally enfranchised management and delegated that authority. As stakeholders become increasingly interest-oriented, their satisfaction now becomes an equal, if not a superordinate, goal of organization along with functional accomplishment. Long guaranteed in the institutionalized arrangements of public organizations, the democratic checks and balances inherent in public arrangements are increasingly evident in the fabric of private interrelationships.

Operationally this means that analysis, which can no longer be restricted solely to managerial activity, must focus instead on issues. Hence, managerial and autonomous activities which define issue legitimacy and shape issue resolution hold the key to understanding control. In the literature of organizational decision making, this thesis has a long history. Questions of issue development, analysis and legitimacy began to be considered in the 1960s (e.g. Schattschneider, 1960), and have continued to surface since then (e.g. Bachrach & Baratz, 1970; Pfeffer, 1981; Ansoff, 1980; Dutton *et al.*, 1983). When attention is focussed on issues, the notions of controller and controllee(s) are augmented by that of interest groups, interrelated and constrained by explicit (formal) and implicit (informal) rules (Diesing, 1962). An interest group can be defined as a group of individuals aware of commonalities beyond work related interdependence (Bacharach & Lawler, 1980) who coalesce around a particular issue or set of issues. Under the assumptions expressed here, an organization is seen as both a goal-oriented, consensually-unified mechanism, as well as an arena where issues are resolved by such groups, each pursuing its own vision of an ambiguous future.

The role of existing managerial control structures and processes in shaping order is ambiguous. Because rules and guidelines channel

information, resources and discretion, these structures moderate the relationships which exist between responsibility units and interest groups (Dunbar, 1981). They draw attention (Cyert *et al.*, 1956) to conflicts among differing norms, values, beliefs and visions, thereby giving rise to issues. These issues are acted upon by responsibility units and interest groups in accordance with their interpretations of the world and their perceptions of equity. But, because the way an issue is initially framed significantly influences its ultimate resolution and acceptance, the relationship between issues and managerial control structures is of crucial significance. Issues may be resolved within the framework established by the existing control system or may lead to modifications in that framework. However, such changes, in turn, redirect flows of information, resources, and discretion, giving rise to new issues and new behavioural responses. This issue-stimulation-and-response process is, in part, the organization's control system.

## IMPLICATIONS

Making the case for an alternative view of organizational control does not answer the question of what this view means for control theory and system design and evaluation today. In the short term, the implications are subtle and incremental; in the longer term, they may be profound.

One implication for system design and evaluation arises from the fact that different answers will be given to the same question, depending on which model of organization is used and which assumptions about organizational order are made. For example, under the functional model of organization and the managerial conception of control, slack and redundancy are usually regarded as dysfunctional and their elimination is deemed desirable. From the pluralistic perspective, however, such inefficiencies are not without benefits. Slack can be regarded as providing the resources and discretion required to explore alternatives, and hence as an investment in creativity (Slevin, 1971) strengthening

pluralism. Rather than being inefficient, duplicate activities and overlapping jurisdictions may necessitate communication, thereby sensitizing participants to the manner in which they interrelate and stimulating self-organized adjustments (Landau, 1969). They make the whole more reliable than any of the individual parts by not trusting each part to work all of the time (Wildavsky, 1976). Thus, disconcertingly, phenomena unacceptable from one point of view become desirable, if not mandatory, from another. But since an awareness of the actual bases of organizational order and the true causes of organizational evolution must precede the development of more applied principles of control system design, the exploration of such apparent inconsistencies can only increase our understanding of control.

The implication for a theory of control is even more provocative. The processes involved in maintaining a pluralistic order are in decided contrast to those of a hierarchically-managed system. Assuredly, they are at the heart of control. Yet how they co-exist is now largely unknown. One possibility is that many of the managerially-based assumptions of functionalism and control are illusory (Normann, 1977; Dunbar, 1981; Salancik & Meindl, 1984) but are tolerated in order to maintain stability (Dermer & Lucas, 1986). Such assumptions include the following: organization exists primarily for purposeful reasons; mandate legitimately entrusted to management can be exercised without challenge; management knows how and is able to conduct organizational activities; an organization has the legitimate right to expect the compliance of internal and external stakeholders. In order to preserve the illusion that these assump-

tions are correct, management must continually win, or at least not lose, must repress disconfirming evidence, and must save face at all costs. Challenges to these premises are undiscussable and their undiscussability is, in turn, undiscussable (Argyris, 1982).

Issues which have the potential to destroy these illusions and to destabilize coexistence between managerial and autonomous activities, are both threatening and emotional. Unless they can be framed in non-threatening, non emotional terms, they never gain legitimacy. Thus they can only be discussed within the conventional strategy/control paradigm. Questions about management's ability to effect change, for example, must be narrowly confined to specific issues so as to diffuse their potential impact. Yet within the latent subtext of organization lie the contradiction-accommodating and self-protecting activities which actually sustain order. These are among the most neglected yet essential ingredients of control theory.

Our intent has been to argue this point by reconceptualizing control and addressing its autonomous dimensions. To do so, we have approached control from a causal perspective concerned with the explanations of outcomes. We have presented a new pluralistic governance model, a model whose assumptions will permit the study of both managerial and autonomous forces. By augmenting the traditional managerial model, based on functionalism, strategy, and cybernetics, with an approach that recognizes the importance of the autonomous activity of self-interested participants, we provide ourselves with a much clearer basis from which to explore control and organizational order.

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## THE GENESIS OF ACCOUNTABILITY: THE WEST POINT CONNECTIONS\*

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### Abstract

We focus on the genesis of the new managerialism in U.S. businesses and factories in the nineteenth century and re-examine the published histories of the U.S. armories and the railroads. We trace the influence in both arenas of the engineering/military graduates from the U.S. Military Academy at West Point, who represent and reproduce the meticulous "grammatocentric" and "panoptic" system for human accountability introduced there in the years after 1817. Our overall concern is to re-analyse apparently economic-rational changes in accounting and accountability in a wider frame which explains their development as aspects of a general shift in power-knowledge relations — a shift which Foucault characterised as the development of disciplinary power and which we argue originated in elite educational institutions. We propose further examination (or re-examination) of the original accounting and administrative records relating to the armories and the railroads in order to establish the precise process of historical change.

The study of accounting, particularly the historico-theoretical study, is moving in interesting new directions. It has become almost a truism to say that one can no longer treat accounting as an isolated craft or neutral technology (Burchell *et al.*, 1980; Hopwood, 1987); instead, as Anthony Hopwood has put it, "its origins are seen to reside in the exercising of social power both within and without the organization." That kind of approach has put two linked problems onto our agenda (linked because they are both historical and theoretical) namely: what are the "origins" we should be looking for and what organizations should we be concerned with?

An earlier study (Hoskin & Macve, 1986) developed Foucault's (e.g. 1977) concept of "power-knowledge" (1) to show how the late

medieval development of accounting technologies, including double-entry, grew out of important advances in the technology of *writing* — the new disciplinary techniques for gridding texts and retrieving information — plus the use of the formal examination, that were first developed in the medieval universities: and (2) to explain the nineteenth-century expansion of a discourse of accounting and accountability in terms of examinational innovations in higher education, viz, the introduction of written examinations and mathematical marking systems at the beginning of that century (Hoskin, 1979).

In this paper we explore the suggestion that the preeminence of the U.S.A. in the development of cost and management accounting might

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be traced to the influence of the engineering graduates of the military academy at West Point, where a meticulous pedagogic system was devised by Sylvanus Thayer in the years after 1817, a "grammatocentric" system based on ubiquitous written archives and examinations utilising mathematical grading.

We have two objectives: first we re-examine the published histories of two industrial institutions well known to have been instrumental in the early development of managerialism in the U.S.A. — the Springfield Armory in Massachusetts, and the railroads, particularly the Western Railroad (whose headquarters also happened to be at Springfield) and the Pennsylvania. We aim to identify how the West Point influence may have spread to them through the social network of its graduates. Second, we call for a re-examination of the original records of these institutions to verify this new history: for the records do not appear to have been examined previously from this "disciplinary" perspective.

Our overall concern is to re-analyze apparently economic-rational changes in accounting and accountability in a wider historico-theoretical frame which explains their development as aspects of a general shift in power-knowledge relations which Foucault characterized as the development of disciplinary power; and to identify where the crucial discontinuities from previous accounting and management practices occurred.

The remainder of this paper is developed as follows. In the next section we first examine the history of Springfield Armory and in particular the development of piece-rate accounting and a new disciplining of work-practice in the factory. Springfield is generally taken as a key institution in the development of the American System of Manufacture, and this analysis will suggest how the "economic" developments there may also be subsumed within a power-knowledge analysis which pays particular attention to the introduction of a new disciplinary educational practice.

Thereafter we examine the nature of the new educational disciplines and the development of total human accountability introduced at West Point between 1817 and 1832 under Thayer,

and then suggest how the social network of West Point graduates should be explored.

Among these West Pointers, a key link appears to be Daniel Tyler, West Point graduate of 1819, who was a member of the board of inspectors that reviewed Springfield's labour practices in 1832. This review led to a new system involving not just piece-rates but a requirement to work a "full-day" and based on measures of time spent in the manufacture of various parts — a full accounting for labour productivity. The resistance to this attempted new discipline and control ultimately led to the appointment of Ripley as a military superintendent of the armory in 1841 — with decisive effect. Uselding's analysis of production and cost figures for Springfield suggests that there is no markedly greater productivity per worker or savings in cost per weapon until the 1840s (Uselding, 1972). Uselding suggests some "managerial" element as the cause and we suggest that the leading candidate here is the successful integration of piece-rate accounting with a clock-regulated workday, utilising inspection and incentive schemes, which follows the appointment of Ripley to Springfield's superintendency in 1841. Our analysis will suggest that piece-rate accounting discovers its power to increase productivity and reduce costs only after it is inserted into a general disciplinary framework, and that the West Point connection is of crucial significance in business and accounting history (cf. Englander, 1984).

In the subsequent sections we turn to the railroads, and comment on their contribution to the early development of control of multiunit enterprises, identified by Chandler, but which appears again to us also to reveal a strong West Point connection — in particular the cases of Whistler on the Western Railroad and Haupt on the Pennsylvania. With regard to organizational structure Whistler's system of complementary chains of command, with clear lines of authority and communication and accountability, derived from constant written reports and evaluations, which was devised in 1841, had its analogue in the systems devised earlier at West Point (where Whistler was a student 1816–1819 and also a



Teacher of Drawing, 1821–1822). On the Pennsylvania Railroad we reassess the respective contributions to the increased sophistication of accounting and to the development of organizational structure of J. Edgar Thomson and Haupt (West Point student 1832–1835).

With regard to the development of detailed cost-accounting on the railroads, the disciplinary basis established in educational marking schemes appears to us a more important factor in the development of control of such large-scale enterprises than the conventionally accepted basis of "economic rationalism"; for, as is well-known the economic significance of the "costs" calculated (e.g. for pricing or pursuit of efficiency) has been criticised theoretically by economists from the very beginning, and throughout history there has been no obvious relationship between the degree of sophistication of such accounting technologies and effectiveness in decision making (e.g. Macve, 1985). We believe the disciplinary focus can contribute significantly to current attempts to explain management accounting practice from a management control theory perspective (e.g. Otley, 1985).

We end by pointing out that West Point should be regarded not as the sole case (for there are parallel developments in other institutions both in the U.S.A. and, e.g. in France) but as a paradigm of the way in which the nineteenth century developments in educational technology came to alter the way in which business was organized and human performance was measured.

In re-assessing the previously published histories of the managerial innovations at these institutions we identify where further examination (or re-examination) of the original accounting and other records is needed in order to verify

our contentions.

The final section summarizes our conclusions, and in the Appendices we consider further the nature of the differences between the institutions on which we have focused and certain other contemporary organizations.

#### "ACCOUNTABILITY": THE NEW FOCUS IN NINETEENTH-CENTURY ECONOMIC ORGANIZATION

##### *Springfield and Harpers Ferry and the "American System of Manufacture"*

In analyses of the genesis of the American system of manufacture the U.S. armories have drawn most attention. At Springfield, more successfully than at Harpers Ferry, control over production and accountability for work done was introduced under the Superintendency of Roswell Lee (1815–1833) (see Deyrup, 1948; Uselding, 1972, 1973; Chandler, 1977). Chandler sums up the innovations under two heads (pp. 73–74): (1) careful identification and inspection of each piece made via a worker's mark and inspector's counter-mark placed on every piece approved and (2) meticulous double-entry book-keeping for every transaction in the enterprise — day-books kept by each master armorer and foreman noting the amount and value of material received by each worker summated monthly into an "abstract book" debiting material issued and crediting items produced, materials on hand and scrap; at the same time each worker submitted weekly and monthly a "return" giving the amount and value of materials currently on hand. The whole was tabulated monthly for each working unit and for the armory as a whole by the foreman and master armorer respectively.<sup>1</sup>

<sup>1</sup> However, other initiatives have not been ignored, particularly the role of the textile factories (see Appendix A). In relation to these early industrial organizations the use of "double-entry" bookkeeping is frequently referred to (e.g. Chandler, 1977, pp. 38, 42, 62, 70, 74). However, as Yamey (1981, pp. 129–130) points out (citing e.g. Baxter, 1956) its use was not universal. But the essential control features comprise (1) records of financial transactions, debts etc. and (2) records of movements of goods e.g. of material issued from or taken into inventory in order to keep a check on the honesty of employees and agents. As discussed below, Lee kept such accounts at Springfield (see footnote 7). These control objectives are essentially the same as those of the accounts that have survived from Classical times and they were not *ipso facto* altered when "double-entry" provided the form of a fully integrated set of interlocking accounts (Macve, 1985).

Thus "as the 1819 report noted: 'Complete accountability is established and enforced throughout'" (Chandler, 1977, p. 74). Interestingly this is one of the earliest recorded uses of the term "accountability", the earliest citation we have found to date being from 1794 (Hoskin & Macve, 1986, p. 124, n. 8). This in itself suggests how the Springfield armory enters into the early stages of a new accounting discourse.

However this accountability was not obviously *economically* productive. Uselding's analyses of the production and cost figures over the period of Lee's superintendency lead him to conclude that there is no overall increase in productivity or savings in cost per weapon at any point; there is instead "a leveling out in the fluctuations of output per worker and cost per musket after 1815" (1973, p. 79). This as he says is important in its own right, in his view suggesting that division of labour and mechanization were undertaken because they were "a powerful technique for breaking the back of labor's resistance to the discipline of factory life" yet he concedes that these changes "proceeded beyond the point dictated by a purely economic calculus" (1973, p. 76) and concludes that since the economic gain was so "tentative and indirect" not to say non-existent for some decades it is now "necessary to go beyond simple deterministic theory, economic or otherwise, to find the source of these technological imperatives" (p. 80).

As a result we need to ask how "complete" this accountability was. Chandler notes that Lee apparently failed to develop accurate costing figures on the production of any item and "to obtain more effective internal coordination and so speed up the flow of materials through his establishment" (1977, p. 74). Thus it appears that there was a less-than-total control-and-prediction function operating into future production of objects. We would add that there appears from the published sources to be no *human* accountability structure operating into a foreseen and prescribed future. (This again is something for confirmation by future research since there has apparently been no detailed investigation of the micro-technologies deployed in the armories from the disciplinary as opposed to the economic perspective.) What we can say at this time is this: Lee's innovations in worker-discipline appear to be much of a piece with those in earlier manufactories and school systems.<sup>2</sup> Equally (as with other such attempts at disciplinary innovation) there appeared overt and covert forms of resistance. Labour history has paid great attention to these (e.g. Thompson, 1967; Prude 1983), although they were equally a feature of student culture at the time in colleges like Princeton and Yale (e.g. Novak, 1977).<sup>3</sup>

So at Springfield there was an attempt at a certain kind of worker *discipline* based on rules

<sup>2</sup> Apparently (Uselding, 1973, p. 75) he introduced traditional collegiate-style regulations to enforce good behaviour and attendance in 1815 after first dismissing two men for wrestling, and then eleven more for celebrating this first dismissal by trying to cut down the flag pole. Like Slater & Strutt (see Appendix A), he instituted rules prescribing regular attendance and proper behaviour backed up by use of the clock and register. Punctuality was doubtless improved and, as Smith (1977, p. 255) says, the disciplinary system made inroads on the traditional practices of "loitering, gambling and consuming alcoholic beverages, made unexcused absences punishable by immediate dismissal, and held each armorer personally responsible for the damage or destruction of tools consigned to his use".

<sup>3</sup> Under Lee at Springfield there appears, following the flagpole incident, to have been little direct resistance though no doubt covert strategies for beating the system became endemic and informal agreements were established (voluntarily or under duress) between supervisors and workforce out of sight of the Superintendent. Such a scenario is supported by events following Lee's replacement by a civilian from 1833. Though for instance productivity among barrel-welders remained much the same up to 1841 at c. 2300 barrels per man per year (see Deyrup, 1948, Appendix D, Table 5 (reproduced here as Table 1)) a War Department board reported gross irregularities in work practices (Deyrup, 1948, pp. 162-163):

no regular hours were established for labor. Every mechanic, working by the piece, is permitted to go to his work any hour he chooses . . . The reading of newspapers during the ordinary hours of labor appears to be . . . common . . . in several instances the reading was continued even during the inspection of the board.

Deyrup adds (p. 164) that hostility towards inspectors resulted in 1834 in a regulation "requiring workers to respect the official character of the inspectors". For the contemporary situation at Harpers Ferry see Appendix B.

(about regularity and punctuality of attendance and proper behaviour) and registers and inspection — “hierarchical surveillance” after Foucault’s (1977) idiom, certainly: but where was the “normalizing judgement”? This was a *negative* power of judgement concerned with suppressing secret practices and irregularities. It was not a *positive* power presenting *norms* of good practice and performance against which each individual’s commitment and omissions were constantly evaluated or through which some officially prescribed *self-discipline* could come to be internalized.<sup>4</sup> The secret power of the disciplinary lies in structures which produce such self-discipline — among workers, up and down a managerial/hierarchical system and laterally, i.e. a self-discipline which is also a reciprocal discipline, enforced by the self on others and by others on the self. Lee’s style of worker discipline like earlier styles could never consistently produce this reciprocal discipline of

selves: as we shall argue it lacked any kind of “supra-monetary money of account” and therefore could not engender a full system of human accountability.<sup>5</sup>

So Lee’s innovations, even in the strictly economic sphere, produced a less-than-complete accountability<sup>6</sup> and do not appear to be explicable solely as *economic* rationalism. Here we differ from Chandler (1977, p. 73) who notes the various aspects of Lee’s new regime (centralizing authority and responsibility in the office of the superintendent, reorganizing the administration, activating “a set of controls that assured accountability for material used and for the quality of the product”) and ends by saying that this “permitted the piecework wages to be accurately determined”. We would agree with everything up to the last statement, for all the prior strategies fall under two heads — the *negatively* powerful direct disciplining of labour and an accountability over *objects produced*. But the his-

<sup>4</sup> The use of norms and standards in medieval estate accounting is well attested (Noke, 1981). But there the “expected yield” of land or flocks, derived from the “extent”, was an audit tool to try and pin down (often as an alternative to detailed checking of transactions and often not very successfully) the financial accountability of one known man — the bailiff or reeve — (as the Inland Revenue might question a trader’s gross profit margins today). As we show below, the new development in the nineteenth century, made possible by the concept of the mark, is the establishment of norms of human behaviour which give individuals a value and fix their place in a statistical population — where people become visible and of individual concern only if they deviate from the norm. It is this concept which is applied to the organization of large-scale businesses.

<sup>5</sup> This is particularly clear when we turn to the specifically economic sphere of worker-control, payment for work done. This is the historical period when a fully monetary economy develops and the cash nexus becomes central (Berg *et al.*, 1983). In the armories, as elsewhere, one traditional mode of payment which was given a new emphasis was the piece-rate, in itself a good disciplinary system of payment-by-results; and considerable attention has been paid to the piece-rate system and piece-rate accounting, particularly at Springfield (Deyrup, 1948; Uselding, 1973). In conjunction with this there was a considerable expansion in the division of labour. However, we see here again a need to re-read the archives in the light of this disciplinary perspective: for a careful reading of the published sources once more suggests that there was no proper strategy for producing human accountability in the early development of piece-rates and piece-rate accounting in the armories.

<sup>6</sup> Deyrup (1948, pp. 107 ff.) notes that on Lee’s arrival in 1815 part-payment in kind of staple goods “was converted to money wages”, and under his work-regulations the tradition of moonlighting (largely in farm work) was curtailed. Piece rates had “predominated from as far back as 1806” and probably dated to the foundation of the armory although detailed records do not exist. However in 1818 the wage system was revised and shifted further towards piece-work in line with the general reorganization of production. The departmental or unit structure under the foremen and inspectors with their powers of surveillance and recording was used to expand and rationalize the division of labour.

Smith points out (1977, pp. 81–83) that division had been introduced by Lee’s predecessor, Benjamin Prescott, in conjunction with the earlier piece-rate system back in 1806. By 1810 some 20 occupations are listed and by 1815 34. (Meanwhile Stubblefield had introduced a similar system at Harpers Ferry following a visit to Prescott in 1809: by 1816 musket production there was divided into 55 tasks. The greatest division, Smith notes, was in lock-making; in 1807 two artisans, one forging and one filing, made a lock-assembly. By 1816 there were 21 tasks: “seven in forging . . . , eleven in filing and three in finishing”. Thereafter, however, division went little further at Harpers Ferry: by 1820 from 55 to 60 tasks and by 1825 only to 64.) Lee, though, in line with his general disciplinary rationalization, combined piece-work, division of labour and detailed accounting to a markedly greater extent. The 34 occupations of 1815 grew after the thorough revision of 1818 to 86 in 1820 and 100 by 1825 — an “amazing 188 percent growth” as Smith says (p. 83).

torical record suggests that the last statement cannot be left to pass unquestioned; for there does not appear to have been any reflexive use made of the payroll and work-return accounts to construct *norms* of payment based on *time actually spent* in labour in addition to the pieces produced. This failure of course fits with the absence of (similarly reflexive) costing computations. Together they would do much to explain, at the human level of worker-diligence, the lack of increase in productivity. Lee's innovations would appear to fail on this count because they did not implement a technology for full accountability and so no appropriate discourse.<sup>7</sup>

It is true that a merit system operated insofar as payment was only made for approved pieces and to a further extent, as Deyrup says (1948, p. 105), "for certain kinds of work" where an incentive wage might be applied "to improve the *'quality of the product'*" (emphasis added). This was done most in stocking and barrel welding, and done as Lee wrote in 1821 (Deyrup, p. 106) "according to the skill and fidelity of the workmen". There were three prices for stocking and two or more for barrel-welding, an extreme

being reached in January, 1821 when six rates were paid — 20c, 21c, 27c, 30c, 31c and 37c.

What we do not yet know is how "skill and fidelity" were evaluated in order to assign these rates (and perhaps even on re-examination the records will not yield such data). But at best this is a specific kind of incentive payment made to keep quality up. Two things appear to be constantly absent: any analysis of time spent in producing objects or of wages in relation to costs. In these respects it is, to us, not surprising that there is no apparent discourse revolving around the issues of productivity or profitability, and certainly we would suggest that there is no evidence adduced to date which justifies the idea that piecework wages *were* accurately determined either in terms of productivity or profitability. Indeed Deyrup's analysis suggests a quite different set-up. While incentive wages were used in the restricted way just described, rates in general were set without reference to any economically normalizing judgement. Judgement was based on the simpler criterion of comparative worker satisfaction.<sup>8</sup>

Overall for the period 1802–1830 Deyrup

<sup>7</sup> The 1819 Report to the War Department by Major Dalliba certainly suggests as much. This refers in the first place to supervisors being "accountable for all stock, tools and parts of work delivered them" and individual workmen being similarly accountable while inspectors are "responsible for the faithful and correct performance of the work", signalled by the mark inscribed "when they examine and approve the various parts of the musket" (cited in Uselding, 1973, p. 72). This is primarily an accounting of objects and an examination of products. Dalliba also remarks (Deyrup, 1948, p. 109) that "it has this advantage, that every man is paid according to his merit; it excites ambition and industry. . . it has a moral, good tendency upon the workmen, and at the same, or for less price, gives annually to the Government a much greater number of arms." Yet the latter assertion has been proved by modern economic analysis (Uselding, 1972, 1973) not to be the case, and the former may similarly be somewhat less than the truth.

Dalliba's discourse speaks (in terms that would have been familiar to the Jesuits or Adam Smith), of what David Hamilton has called a "moral economy" (Hamilton, 1980) based on emulation and an ethic of hard work. Lee's piece-rate system was to that extent a merit-system, but an accountability system only in respect of material and products. For instance, as we said above, the master armorer's monthly "abstract book" debited each worker for items received and credited parts produced, materials on hand and scrap while the foreman's abstract credited "units completed, units on hand, scrap waste and tools returned as worn out" (Chandler, 1977, p. 74). Accountability for objects and material was clearly the main focus, and sanctions were applied to that end, as Dalliba reported, for if this credit balance did not equal the debit for items received the workman was "made to pay for the deficiency".

<sup>8</sup> Springfield was a government enterprise and it wanted the best workers; therefore rates were set "in line with, but slightly above, wages at other armories and in other industries" (Deyrup, p. 105). In addition officers "kept in view the cost of living, and if it rose sharply allowed wage increases". On this basis "a 'tariff' or scale of wage rates was worked out". Sometimes this went up, as in 1826 when 12% was added to piece-rates (but note this was across the board without reference to detailed productivity or profitability analysis by work-units or occupations). Equally it might go drastically down, again across the board, as Deyrup observes (p. 106) by 10%, 15% or even in 1820 by 25%. On this occasion Lee justified the reduction in terms of a general deflation which meant that "a Dollar purchases as much as a Dollar and a half was (sic) two or three years ago. And the prices of everything, labor among the rest, must be accommodated to the actual state of the Currency".

No meticulous economic analysis there: only a constant effort to reconcile marginal advantages over other employers with

finds that mean monthly money wages "increased steadily . . . to more than double the original figure (while) mean monthly real wages were about tripled" (p. 110). Moreover she stresses the role played by worker self-regulation in this by reference to the suspicious uniformity in each individual's monthly barrel-production — for instance in February, April and May, 1823, each of the six barrel welders produced 200 barrels, in August and October 202 barrels, in September 232 (except for one who was absent with a return of zero). Such uniformity, as she says, "implies . . . considerable excess productive capacity" which could be drawn upon when needed for reasons of increased living costs, decreased pay or several days' absence. It also implies (a) wage rates sufficiently high for workers to agree this uniform yet monthly variable strategy and (b) no structure of management accountability powerful enough to disrupt it.

In sum, Lee's innovations, despite their deployment of disciplinary and accounting technologies, had not turned the work-force into "calculable men". The rules, records and figures might be meticulous but discipline and accounting operated side by side, one on men and the other on objects, rather than in a reciprocal pattern of mutual reinforcement. The piece-rate system perhaps epitomizes this disjunction. On the one hand as a payment it was basically expected to be discipline in itself: on the negative side it withheld payment from pieces which failed their examination while on the positive it was supposed to excite, in Dalliba's words (see again footnote 7) "ambition and industry", but there were no objectively fixed and legitimated targets to ensure that it should do so systematically. On the other hand, the piece-rate accounting system ensured on the negative side that waste, pilfering and loss of material was minimized while on the positive it promoted a

regular production of quality items. (In this respect it is analogous to the introduction of standard "go/no-go" gauges which also regularized the quality of parts, rendering them increasingly interchangeable.)

But the payment and accounting functions were not apparently coalesced into an overall accountability system. For that to happen discipline has to become a constant examining, recording and appraisal based on "objective" norms and grades of performance, behaviour and skill, just as an accounting eye has to survey the whole field of work, expenditure and return. This is perhaps two ways of saying the same thing: for once discipline and accounting came thus together, they automatically found themselves producing a discourse of both financial and human accountability.

The point seems to be this: the Springfield experience under Lee [rather like the Etruria experience under Wedgwood beginning in the 1770s (McKendrick, 1961, 1970; Hopwood, 1987) and the experiments in the early textile factories (see Appendix A)] shows that a general discourse of accountability did not simply reside in rules, records and figures, howsoever systematically kept. Such a discourse had to be actively discovered and constructed; it was at first a silence within the accounting and disciplining texts and practices.

The question then becomes: how was such a discourse discovered and constructed? Our answer, *pace* economic rationalism, is that it was not constructed in the economic field at all but in the pedagogic. Discipline and accounting came together in the institution where they had a shared vocabulary or currency, the both supra-monetary *and* disciplinary money of account, the mark. With that shared vocabulary they could construct a joint discourse which could then in the work-place be applied to both the financial and the human fields. In the U.S. it so hap-

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a fear of excessive cost and financial exploitation by the work-force. The net effect, however, so Deyrup's figures suggest, was to create space for just such consequences. It proved difficult to keep wage costs down while the desire for marginal advantage was so prominent and productivity norms were apparently non-existent. For instance on Deyrup's figures (Appendix D, Table 3), even while mean and modal wages fell in money terms in 1820 (from \$38.43 to \$33.71 and \$37.36 to \$27.65 respectively), (a) they rose in real terms based on an extrapolation from Moulton's index of real wages of all U.S. workers 1801–1832 and (b) in money terms they were back to 1819 levels by 1824 (at \$38.25 and \$42.37 respectively).

pened that the institution which developed this shared vocabulary more than any other before 1830 was West Point.

We now seek to offer an explanation for the increased productivity and savings in cost per weapon when they did occur, which appears to

be the 1840s. Deyrup's figures on barrel-welding [1948, Appendix D, Tables 5 and 6 (reproduced here as Tables 1 and 2)] show a rise in average barrels welded per man from a figure never above 2500 before 1840 to 2984 in 1842 and an average around 4000 thereafter, while piece-

TABLE 1. Productivity of barrel welders at Springfield Armory, 1806-1870

| Year | Average number of<br>barrels welded annually<br>per man, rounded to<br>nearest whole number | Year | Average number of<br>barrels welded annually<br>per man, rounded to<br>nearest whole number |
|------|---------------------------------------------------------------------------------------------|------|---------------------------------------------------------------------------------------------|
| 1806 | 1200                                                                                        | 1839 | 2420                                                                                        |
| 1807 | 1565                                                                                        | 1840 | 2207                                                                                        |
| 1808 | 1454                                                                                        | 1841 | 2537                                                                                        |
| 1809 | 1267                                                                                        | 1842 | 2984                                                                                        |
| 1810 | 1319                                                                                        | 1843 | 3791                                                                                        |
| 1811 | 1485                                                                                        | 1844 | 3975                                                                                        |
| 1812 | 1495                                                                                        | 1845 | 3501                                                                                        |
| 1813 | 1117                                                                                        | 1846 | 3988                                                                                        |
| 1814 | 1050                                                                                        | 1847 | 4780                                                                                        |
| 1815 | 1118                                                                                        | 1848 | 4368                                                                                        |
| 1816 | 1087                                                                                        | 1849 | 3882                                                                                        |
| 1817 | 1249                                                                                        | 1850 | 4079                                                                                        |
| 1818 | 1357                                                                                        | 1851 | 3700                                                                                        |
| 1819 | 1654                                                                                        | 1852 | 4178                                                                                        |
| 1820 | 1939                                                                                        | 1853 | 3828                                                                                        |
| 1821 | 1851                                                                                        | 1854 | 4198                                                                                        |
| 1822 | 1873                                                                                        | 1855 | 3632                                                                                        |
| 1823 | 2208                                                                                        | 1856 | 4825                                                                                        |
| 1824 | 2407                                                                                        | 1857 | 5403                                                                                        |
| 1825 | 2397                                                                                        | 1858 | 4767                                                                                        |
| 1826 | 2137                                                                                        | 1859 | 1231                                                                                        |
| 1827 | 2494                                                                                        | 1860 | 12615                                                                                       |
| 1828 | 2378                                                                                        | 1861 | 20180                                                                                       |
| 1829 | 2153                                                                                        | 1862 | 20430                                                                                       |
| 1830 | 1856                                                                                        | 1863 | 24620                                                                                       |
| 1831 | 1824                                                                                        | 1864 | 24959                                                                                       |
| 1832 | 2209                                                                                        | 1865 | 22669                                                                                       |
| 1833 | 2157                                                                                        | 1866 | —                                                                                           |
| 1834 | 2378                                                                                        | 1867 | —                                                                                           |
| 1835 | 2444                                                                                        | 1868 | —                                                                                           |
| 1836 | 2237                                                                                        | 1869 | 20995                                                                                       |
| 1837 | 2471                                                                                        | 1870 | 25077                                                                                       |
| 1838 | 2338                                                                                        |      |                                                                                             |

These figures were arrived at by the following method: the sum of the months all barrel welders worked in a given year was divided by twelve to give the man-years worked. All months in which welders did not work were excluded. The total annual barrel production of these men for this year, less barrels condemned on inspection, was divided by the number of man-years worked. Barrel welders who regularly worked in some other occupation for more than eight days in the month were excluded from these figures, as were the barrels they produced. Welders who spent all of their working time on barrels, but who were absent for part of a month, were included. (See Deyrup, 1948, Ch. VIII.)

Source: Springfield Armory Work Returns, as tabulated in Deyrup (1948), Appendix D, Table 5.

TABLE 2. Piece-rates for barrel welding at Springfield Armory, 1806–1870

| Year | Piece rate (cents) | Year | Piece rate (cents)  | Year  | Piece rate (cents) |
|------|--------------------|------|---------------------|-------|--------------------|
| 1806 | 21, 25             | 1829 | 18, 26.4*           | 1848  | 13                 |
| 1807 | 28                 | 1830 | 18, 26.4*           | 1849  | 13                 |
| 1808 |                    | 1831 | 18, 26.4*           | 1850  | 12                 |
| 1809 |                    | 1832 | 18, 26.4*           | 1851  | 12                 |
| 1810 |                    | 1833 | 23.8, 25, 26.4      | 1852  | 12                 |
| 1811 |                    | 1834 | 20, 22.6, 23.8, 25, | 1853  | 12                 |
| 1812 |                    |      | 26.4,               | 1854  | 12                 |
| 1813 |                    |      | 27.6, 28.8, 30,     | 1855  | 14                 |
| 1814 |                    |      | 32, 35              | 1856  | 14                 |
| 1815 |                    | 1835 | 12, 14, 18, 20,     | 1857  | 13                 |
| 1816 |                    |      | 22.6, 25,           | 1858  | 13                 |
| 1817 | 35                 |      | 26.4                | 1859  | 13                 |
| 1818 |                    | 1836 | 25                  | 1860  | 11.75              |
| 1819 | 25, 32, 35, 42     | 1837 | 27                  | 1861  | 10.50, 11.75       |
| 1820 | 22.5, 31           | 1838 | 27                  | 1862  | 4.25, 4.5, 10.5    |
| 1821 | 20, 21, 27, 30,    | 1839 | 27                  |       |                    |
|      | 31, 37             | 1840 | 27                  | 1863  | 4.5                |
| 1822 | 26.4, 31           | 1841 | 20, 27              | 1864  | 4.5                |
| 1823 | 18, 26.4           | 1842 | 17.5, 20            | 1865  | 4.5                |
| 1824 | 18, 26.4           | 1843 | 15, 17.5            | 1866† | —                  |
| 1825 | 18, 26.4*          | 1844 | 13                  | 1867† | —                  |
| 1826 | 26.4               | 1845 | 13                  | 1868† | —                  |
| 1827 | 18, 26.4*          | 1846 | 13                  | 1869  | 2.8                |
| 1828 | 18, 26.4*          | 1847 | 13                  | 1870  | 2.8                |

\*The most commonly used piece-rate in this year.

†No barrels welded in this year.

Source: Springfield Armory Work Returns, as tabulated in Deyrup (1948), Appendix D, Table 6.

rates, which had previously on average been around 26 cents (with differentials), dropped to a standard 13c in 1844, reduced to 12c in 1850. Uselding's (1972) analysis suggests that the efficiency gains may be attributable to improvements in "management techniques".<sup>9</sup> We therefore focus next on where those improvements appear to have had their origins: West Point.

*West Point: Thayer's marking systems and the development of human accountability (1817–1832)*

The West Point connection can, we suggest, help us understand the role played by a new kind of deliberative, purposive "managerialism". The scope of the human accountability techniques introduced there under the superintendence of

<sup>9</sup> Various reasons could be adduced (e.g. major improvements in labour-saving machinery; more intense capitalization; the perfection of interchangeable-part technology); however Uselding (1972) after running various factor analyses on technical progress concludes as follows: that to 1831 "total growth in capital efficiency exceeded the total growth in labour efficiency, i.e. roughly the period of Roswell Lee's superintendency. From 1831 to 1841, John Robb's term of office, (there are) cross-overs in the total efficiency plots for the respective factors. After 1841, the period of military control of the superintendency under Col. Ripley, there is a dramatic growth in the efficiency of both factors, with labour efficiency growth outstripping that of capital efficiency" (pp. 303–304). The preponderance of the total shift was accounted for by "disembodied improvement factors" in which labour quality improvement constituted a significant if not a major portion of the disembodied shift (p. 306). These conclusions are seen by Uselding to support the view "that technological change is the result of deliberative and purposive managerial behavior" (p. 292) and in particular that "the quality improvement . . . in what might loosely be described as management techniques (e.g. plant layout, line balances, sequencing, inventory control, etc.) should not be overlooked" (p. 307). We focus here on what we believe the "etc." to have been.

Sylvanus Thayer (1817–1833) was unparalleled within U.S. educational history (and possibly anywhere else at the time). Thayer was sent to Europe prior to his appointment and returned to re-create the Military Academy, which had been founded in 1801, in the image of the *École Polytechnique*. To this end he borrowed its syllabus and text-books, hired one of its teachers, Claude Crozet, and introduced his own version of its pedagogic and examining systems. At the heart of his new regime was the arithmetical grading system of the *École*, which awarded cumulative weekly marks on tests in each subject studied and aggregated them, together with the marks from semi-annual examinations, to give an overall order of merit. Such a system awarded each individual an "objective" statement of his worth while creating a distribution of such values across the total student population. It also facilitated the separation of students by year into four classes and within each class into different sections for each subject on the basis of academic performance.

Thayer showed his hand from the outset. In September 1817 he examined the whole Academy (some 180 cadets) and reported to John Calhoun, the Secretary of War, that some 43 had "serious deficiencies" of whom 21 should be "recommended for removal" (Fleming, 1969, p. 30). By early 1818 he had organized the four

classes into sections, with section transfers made purely on academic merit or the lack of it; as evaluated on the basis of daily progress reports, daily marks, weekly Class Reports and of course the semi-annual examinations (Boynton, 1863, p. 213). On 31 January, 1818 he wrote to Calhoun stating that the sections had all undergone "a rigid examination (in which the demonstrations and operations were performed on the Black-Board)". Class Reports had proved of value "by recording the degree of knowledge which each Cadet evinces of his lesson at his daily recitations. The emulation excited by the Class-Reports and by the merit-rolls has produced a degree of application to study which is believed to be unexampled at this Institution". And he adroitly added that this emulation was further increased "by the expectation which has been encouraged that the Merit-Rolls will be printed and perhaps published in the Army Register".<sup>10</sup>

By 1819 Thayer had established an accountability system which went far beyond the *École Polytechnique* model. The grading for daily recitations at the latter had run from 3 for perfect performance to 0 for total failure. For a while around 1819 Thayer extended this to a grading from 3 to -3 which is interesting in that it creates an academic account embracing both supra-monetary credits and debits. The 1821

<sup>10</sup> This system, it must be said, was not a total departure from earlier practice. The 1816 Regulations state that for purposes of promotion from the Academy into the Army "the lineal rank of each graduating class shall be established in conformity to the principle of general merit, ascertained by a competent board of examiners". However there was no system of constant testing (and promotions in practice depended more on influence). Thayer was able to use his meticulous objective marking system to enforce a new level of academic productivity within the institution and to guarantee that promotions would be based exclusively on the overall Register of Merit. Thus Thayer's 1818 Regulations stipulate that promotion shall follow the ranking of cadets in "general relative merit as ascertained by the Academic staff at their final examination" allowing only that "particular talents . . . will also be had in view . . . but never . . . to interfere with . . . general merit". To his dismay, however, the Class of 1818 was not large enough to fill all the officer vacancies and the influence-peddlers succeeded in getting three appointments for ex-cadets whom Thayer had failed.

His response was typical: he attempted to get the appointments revoked. But Calhoun and President Monroe refused and instead he was empowered to extend his accountability system by submitting in future a report on every cadet dismissed detailing his "particular proficiency and deficiency, his temper and habits and especially whether his dominant propensity impel him to the profession of arms". Thayer interpreted this as good cause to introduce a new archive, a Report of the Progress, Aptitude and Habits of all cadets dismissed after the annual examination from any of the four classes, and later added to it a similar Report on the first-year cadets submitted after their first semi-annual examination (henceforth known officially as the probationary examination). Then in an 1819 Revision of the Regulations a new Rule with Respect to Promotion was added, namely that no Cadet dismissed "on account of idleness, neglect of duty or any species of misconduct" should be appointed to any military post "until at least five years after the promotion of the class to which he belonged" (see United States Military Academy, 1832, p. 22; the date of the innovations is known from earlier Regulations in the West Point Archives).



Regulations give an example (Chart B, 1821) of a weekly Class Report from the Second Section of the Second Class in Philosophy. The names are listed alphabetically in a column on the left, the days set out in a row across the top, and total marks listed in a column on the right. Most cadets are in credit, but not all (e.g. a certain McCall has a total of  $-1\frac{1}{2}$  for the week). In addition a further column on the far right, headed "Remarks", states "Progress from Proposition 315 to Proposition 380 in Gregory's *Mechanick's Vol. I*". In other words there is a joint "objective" measure of productivity, in terms of quality of performance and work done. The work done is measured in number of propositions covered, while the value of the academic currency is expressed in a key at the bottom, which runs from 3 to  $-3$  by gradations with evaluative terms defining and interpreting the numerical judgements, as follows:

|      |        |   |      |   |        |     |       |    |
|------|--------|---|------|---|--------|-----|-------|----|
| Best | V.good |   | Good |   | Indif. | Bad | Worst |    |
| 3    | 2½     | 2 | 1½   | 1 | 0      | -1  | -2    | -3 |

This is the essence of objective evaluation: its signs function and interact in both the numerical and linguistic modes. The numerical sign gives precision to the linguistic evaluation just as the linguistic sign gives evaluative fullness to the numerical statement. (For a later version see Table 3.)<sup>11</sup>

From this basis an interlocking network of "objectively" based evaluative registers was constructed. There were additional weekly Class Reports summing the extremes by subject and section: Column 1 named the Class, Column 2 the Subject, Column 3 the Section, Column 4 the Best, Column 5 the Worst, and these extremes were clearly based on some numerical cut-off since in the example given no First Section has any name in the Worst category while all bottom sections have one or more. From these weekly reports a monthly "consolidated report of pro-

gress" was made and forwarded to the Commandant of the Corps of Engineers in Washington (Regulations of 1832, p. 17). Other registers were also compiled and forwarded regularly like the progress reports mentioned above. Some of these registers tended towards the numerical style of expression, like the weekly Class Mark Reports, others towards the linguistic, like the progress reports which had columns for Aptitude, Study Habits, General Conduct Habits and "Whether Military", under which one finds evaluative comments providing a classification, e.g. under Aptitude "Very Little", "Little", "Ordinary", "Good", under Habits, "Extremely Bad", "Very Bad", "Rather Bad", "Indifferent", "Not Good", and under Whether Military "Very Unmilitary", "Not Military", "Not Unmilitary", "Rather Military". But at either end of this judgmental discourse the same constraints apply: this is a human accounting based on the double principle of a linguistic-numerical value system. The linguistic evaluations may be amusing to us (though not to their victims) but they are categorical and purportedly objective discriminations just like the numerical ones. They are two faces of the same currency of evaluation.

So a whole system was developed. Mirroring the progress reports on the deficient, Thayer created by 1821 an annual list of those who had "most distinguished themselves in the examinations, not exceeding five in each class" also forwarded for publication in the Army Register. And the keystone of this whole edifice was the General Merit Roll. The 1821 Regulations refine the academic currency by differential weighting of subjects so that there is a total monetary (or rather supra-monetary) system. Daily recitation marks are first aggregated with examination marks for each subject, then the weighted totals for the subjects are added to give a General Merit score by which the students are ranked from top to bottom. And for the Senior or First Class the significance stretched even beyond the

<sup>11</sup> The 1832 Regulations give a later example from 1830 (reproduced here as Table 3) with the Remarks column left blank. Here the grading system had reverted to 0 as the base line, but discriminations were now made in quarters from 3 down to  $\frac{3}{4}$ , plus the 0 category, giving 11 categories instead of 9. For the manner in which these marks function as Foucault's "double signs" see Hoskin & Macve (1986) pp. 117, 127.

TABLE 3. West Point: specimen class report from Regulations (1832)

| B. (See par. 55.)<br>U.S. MILITARY ACADEMY, WEST POINT |             |                          |    |    |    |    |    |       |         |
|--------------------------------------------------------|-------------|--------------------------|----|----|----|----|----|-------|---------|
| Weekly class report                                    |             | Department of Philosophy |    |    |    |    |    |       |         |
| Week ending Nov. 18. 1830                              |             | Class Second             |    |    |    |    |    |       |         |
|                                                        |             | Section second           |    |    |    |    |    |       |         |
| No.                                                    | Names       | M                        | T  | W  | T  | F  | S  | Total | Remarks |
| 1                                                      | A . . . . . | 3                        | 2¾ | 2½ | 2½ | 2  | 2¼ | 15    |         |
| 2                                                      | B . . . . . | 3                        | 2½ | 2½ | 2  | 2  | 2¼ | 14¼   |         |
| 3                                                      | C . . . . . | 3                        | 2¾ | 2¾ | 2½ | 2¼ | 2¼ | 15½   |         |
| 4                                                      | D . . . . . | 3                        | 1¾ | 3  | 2¾ | 2¾ | 3  | 16¼   |         |
| 5                                                      | E . . . . . | 3                        | 2¼ | 2  | 2¼ | 2  | 2  | 13½   |         |
| 6                                                      | F . . . . . | 3                        | 3  | 3  | 2¾ | 2¾ | 3  | 17½   |         |
| 7                                                      | G . . . . . | 3                        | 3  | 3  | 2¾ | 2½ | 3  | 17¼   |         |
| 8                                                      | H . . . . . | 1¾                       | ¾  | 1½ | 2  | 1  | 0  | 7     |         |
| 9                                                      | I . . . . . | 3                        | 3  | 3  | 2¾ | 2½ | 3  | 17¼   |         |
| 10                                                     | K . . . . . | 2½                       | 2¼ | 2½ | 2¼ | 2½ | 2  | 14    |         |
| 11                                                     | L . . . . . | 2¼                       | 2¼ | 2¼ | 2  | 2¼ | 2  | 13    |         |
| 12                                                     | M . . . . . | 2¼                       | 2½ | 2¼ | 2  | 2¼ | 1¾ | 13    |         |
| 13                                                     | N . . . . . | 1                        | 2¼ | 2¼ | 1¾ | 2  | 1¾ | 11    |         |
| 14                                                     | O . . . . . | 2                        | 1¾ | 2  | 1½ | 1¾ | 1½ | 10½   |         |
| 15                                                     | P . . . . . | 2¼                       | 2½ | 2  | 2  | 2  | 1¾ | 12½   |         |
| 16                                                     | Q . . . . . | 2½                       | 2  | 2  | 2  | 2¼ | 2  | 12¾   |         |
| 17                                                     | R . . . . . | 3                        | 2¼ | 2¼ | 2  | 2¼ | 2  | 13¾   |         |

A.B

*Assistant Professor of Philosophy*

To Lieut. Col. S. Thayer

*Superintendent U.S. Military Academy**Explanation of the figures and signs used above*

| Scale of Merit | Best |    | Very good |    | Good |    | Indif. |    | Bad |   | Worst |
|----------------|------|----|-----------|----|------|----|--------|----|-----|---|-------|
|                | 3    | 2¾ | 2½        | 2¼ | 2    | 1¾ | 1½     | 1¼ | 1   | ¾ | 0     |

Academy, for by this time appointment to the various Army units — Engineering, Artillery, Fortifications, etc. — depended purely on final rank, with Engineering at the top.

One final behavioural refinement remained. From September 1819 Thayer kept a Book of Delinquencies with a page for each cadet on which was noted any reported infraction of the rules from lateness on parade to gross disobedience. Around January 1826 the entries become *mathematized* as delinquencies are arranged into seven classes, each comprising "those of

nearly the same degree of criminality", in which first class offences earn 10 demerits, second class ones 8, third class ones 5 down to seventh class ones worth 1. (These are then weighted by year, being increased by one-sixth, one-third and half for second, third and fourth years respectively.) He can then create a mathematical annual Conduct Roll in which all aspects of behaviour are rendered potentially accountable.

Full accountability only ensues in 1832 after he discovers that some students run up huge accounts (in 1829 one student accumulates 723

marks). From that point on a cut-off of 200 demerits is set: 201 in a year bring dismissal. Conduct is thereby factored in as one more mark in the General Merit Roll (with a low demerit score reversed as a high mark) while also having its own Merit (or Demerit) Roll.

This is a total human accountability system, where all aspects of performance, academic and behavioural, are constantly measured, evaluated and recorded in a joint numerical-linguistic language which is also a currency. It stretches from the past through the present and into the future. The past as recorded follows one insistently into the future within the institution and beyond; at the same time that future exerts a constant pressure on one's academic and behavioural performance in the present, as does the retrospective recall of the past (for good performance from now on may count against mistakes and failures already recorded). Thayer's cadets were truly rendered "calculable men".

And let us always remember that this was positive power — indeed in power-knowledge terms it can be seen as a glorious historical moment. Just in terms of the knowledge acquired there was a quantum leap at West Point compared with other U.S. institutions of the day. As Chandler remarks (1977, p. 95) "the United States Military Academy provided the best formal training in civil engineering in this country until the 1860s" which made it unsurprising that a number of graduates "came to build and manage railroads". But such an analysis ignores the other side of the equation, the quantum leap in positive power and its deployment internalized by those who passed through the Thayer system.

Chandler does go on to note (*ibid.*) that the

Ordnance Department and the Corps of Engineers were "two of the very few professionally manned, hierarchical organizations in antebellum America". We are suggesting that it is time to pay attention to the questions: who those "professionals" were, where they came from and in what their "professionalism" consisted. The general answer, as we see it, is that at West Point a new breed of knowledge and power experts was created, a breed who lived and breathed accountability as well as technical skill and who, by the 1820s, were in a position to export it into the socio-economic world beyond.<sup>12</sup>

#### *West Pointers and Springfield Armory*

With regard to Springfield, our argument above has been that despite all the undoubted technical and disciplinary innovation under Lee's superintendency, it was an advanced but still pre-modern system of production control that he implemented. The development of full human accountability came later. Where from? If we are right, then it seems that the West Point connection should be pursued in all its ramifications, since that was the one place where, so far as we know, a total accountability system was developed by the 1820s.

There would appear to be two parts to such an investigation: first the role played by the social network of pre-Thayer West Pointers. This network would include Thayer himself and such men as Decius Wadsworth, Chief of Ordnance from 1815 to 1821, as well as the West Point graduates themselves such as George Bomford, Wadsworth's assistant and successor as Chief (1821–1842) and men like Ripley who

<sup>12</sup> There is one supplementary point. Thayer did not overlook the financial and economic aspect of accountability. Section XI of the Regulations, "Pay and Accounts" (United States Military Academy, 1832, pp. 25–26) required that every cadet keep a Check Book recording "every article he may purchase on credit. This book shall be examined by the Superintendent and if found correct shall be a voucher to the Treasurer for the liquidation of the debt." No cadet received his pay direct. It was credited to his individual account kept by the Treasurer who also noted all debts, and wrote in addition "proper receipts . . . kept on file in his office for all moneys paid by him on account of any Cadet". This in itself was an extraordinarily grammatocentric system where no-one in theory, while a Cadet, dealt in specie; all transactions were done in writing. And Thayer, scrupulous to the last, guaranteed that accountability should be reflexive, covering the Treasurer too, in due process. For, by regulation (p. 26) "Any Cadet will be permitted to inspect his accounts on application for that purpose in office hours". A sense of specifically financial and economic accountability was therefore one more dimension of the experience Thayer's graduates took with them.

graduated from West Point in 1814. Second it is necessary to investigate what difference, if any, the Thayer regime made.

On the first issue Smith (1981) and Hounshell (1984) have recently made significant contributions. So far as concerns technical uniformity (and so product accountability) the pre-Thayer men form a committed group. French military practice became well-known to Americans during the Revolutionary War, and afterwards links continued, as several French officers stayed on.<sup>13</sup> Others arrived after the French Revolution, including Major Louis de Tousard, who actively promoted, among other things, "*le système Gribeauval*" of interchangeable-part manufacture. In 1795 he became a major in the new Corps of Artillerists and Engineers and began a work on artillery (published in 1809 as the *American Artillerist's Companion*), while also in 1798 producing a pamphlet on the "Formation of a School of Artillerists and Engineers" (Hounshell, 1984, pp. 26–27). The latter has been called the "blueprint" for West Point (Wilkinson, 1960), while the former became the standard artillery text-book at the Academy. Thus Tousard is a crucial intermediary. From our perspective he is doubly crucial, for he was promoting both technical and pedagogic innovation.

In regard to the pedagogic innovations Bradley (1985) has recently shown the sophistication of both technical and disciplinary methods in the French specialist *Écoles* even before the Revolution,<sup>14</sup> which formed, for the time, a sophisticated power-knowledge system; and it was that which Tousard brought with him.

What Smith then points out is that Tousard initiates a disciplinary discourse. His book argued for "a system of uniformity and regularity", and

pointed out that under a military system of armories officers could be "made accountable" for failures of production (Smith, 1981, pp. 66, 97). And Wadsworth, who served in the Artillerist Corps with him, then became a champion of the system, particularly after the creation of the Ordnance Department in 1812 where he was appointed the first Chief. He himself had become an officer before the foundation of the Academy, but he turned to its early graduates for his assistants. Chief among them was Bomford; he had had the typical brief cadet career of the early days, appointed to the Academy on 24 October, 1804 and commissioned as second lieutenant of engineers on 1 July, 1805, but he had subsequently showed his technical skill by designing the "Columbiad" howitzer. He was also well-connected. Smith has said of him that he "exemplified both a new breed of professional soldier and the upper crust of Washington society" (Smith, 1977, p. 153). His wife was the sister of Pennsylvania congressman Henry Baldwin (who was later a Supreme Court Justice) and his military friends included Stephen Decatur, Andrew Jackson and Thayer. The other significant appointment was that of Lee.

Thus from Tousard and the French *Écoles* via Wadsworth to West Point and its early graduates there runs a clear line of transmission in which technical knowledge and pedagogic disciplinary power are intertwined. Uniformity and accountability were clearly on the agenda. And what the historical record now shows is that at the armories, particularly at Springfield under Lee, armsmaking, as Hounshell puts it, "was transformed from a craft pursuit into an industrial discipline and the weapon from a shop creation into a factory product" (Hounshell, 1984, p. 33). Yet both the extent and limitations of the inno-

<sup>13</sup> It has long been known that Honoré Blanc was attempting interchangeable-part manufacture in France in the 1780s and that Jefferson wrote from France recommending the scheme to the U.S. government. However it is now clear that this was not just a personal scheme but one backed by the French military from around 1765, particularly General de Gribeauval, after whom the scheme was called "*le système Gribeauval*" (Hounshell, 1984, p. 25).

<sup>14</sup> At the *École des Ponts et Chaussées* studies by 1789 included advanced mathematics, conic sections, the application of differential and integral calculus to road and bridge construction, mechanics and hydraulics. Each year there were prize competitions in the various subjects (but not examinations). From 1772 an invariable tariff of *degrés* or points was attached to each prize, but there was no complete ordering of marks for each student. Instead, the best nine students (with the highest number of *degrés*) were appointed "*gradués*". Such *gradués* tended to get preferment in subsequent military service.

vations need careful consideration. Hounshell, for his part, reminds us that on the production side "many of the seminal ideas and machines developed at the armory originated outside this government establishment" (Hounshell, *ibid.*).<sup>15</sup> Overall it appears that this pre-Thayer generation did not at first have the means to enforce a *total reflexive accountability*. Their approach (and its success) is restricted; and they apparently only *discover* the full potential of the system partly begun as they are joined, from the 1820s, by the second, post-Thayer, generation of West Pointers.

This generation clearly continued the commitment of their elders and were rewarded within the army hierarchy when successful; and they do appear to have been more successful. For instance, Craig's performance at Harpers Ferry (see Appendix B) clearly won him approbation as he established better discipline and accountability (in 1851 he became Chief of Ordnance and continued to support a military superintendency in an increasingly hostile political climate which in fact led to a restoration of civilians in 1854). A contribution to rationalization was also made by Major John Symington, described by Smith as "an eccentric but talented West Point engineering specialist" (1977, p. 276), who replaced Craig at Harpers Ferry in 1844 and organized a complete renovation of the armory's physical plant, re-siting the shops into a rational through-put system.

Also in this group there is Colonel George Talcott. He was already in post in the Ordnance Department by 1826, and by 1832 was one of Bom-

ford's principal aides with the post of Inspector of arsenals and armories.<sup>16</sup>

However, if this group arguably had more success in organizing production and enforcing accountability, can we give specific reasons why they should have? Was their success nothing more than an evolution from earlier initiatives? We would suggest that it was something more, deriving from their West Point experience — an experience which the earlier generation had not undergone and with which to all appearances Tousard was unfamiliar in pre-Revolutionary France. As graduates of the Thayer regime they were intimately acquainted with a *generalized accountability* system. Following a strike at Harpers Ferry in 1842 (see Appendix B), Talcott's report to the Secretary of War shows a decisive advance in this respect over anything done with the piece-rate system in the 1820s. He states (Smith, 1977, p. 274) as follows:

the *real ground of opposition* to the present mode of supervision is well known to be this. The men have been paid high prices & were in the habit of working from 4 to 6 hours per day — & being absent whole days, or a week. At the end of a month their pay was generally the same in amount as if no absence had occurred. They are now required to work full time and during fixed hours (according to old regulations) and the master of the Shop keeps a time account showing the time *actually spent in labor*. Here is the *great oppression* complained of. At the end of a month the *quantity of labor performed*, or *product*, and the *time* in which it is effected are seen by simple inspection of the Shop books. The degree of diligence used by each man is also known and hence results a knowledge of what is the *fair price* to be paid for piece work!!!! (Original emphases).

<sup>15</sup> For instance Blanchard's series of machines for mass-producing stocks (though Blanchard developed the full system as a sub-contractor working within the armory) and Hall's successful interchangeable-part system of rifle production (though again this was achieved at his Rifle Works sited within the Harpers Ferry Armory compound). In both these cases the disciplinary matrix can hardly be discounted.

<sup>16</sup> In that year he carried out an inspection of Hall's Rifle Works at Harpers Ferry and reported with enthusiasm that "this manufactory has been carried to a greater degree of perfection as regards the quality of work and uniformity of parts than is to be found elsewhere" (Smith, 1977, p. 222). He carried out another inspection of Hall's works in 1836 reiterating his admiration, and subsequently in 1841 provided the information, based on his inspections, with which Bomford built the case for a return to military superintendency (Smith, pp. 267–268). In 1842 he succeeded Bomford, whereupon he intervened in the Harpers Ferry clock strike, stressing that the work-regulations were "not changed . . . merely enforced". And, along with Craig, he was proposing physical rebuilding of the armory even before Symington was appointed; it was only (Smith, p. 276) because "lingering depression severely restricted War Department finances" that the rebuilding was deferred. (See further Appendix B.)



Talcott is explicitly referring to a time:work ratio as a form of labour-costing and productivity device. This is no longer just an accountability for objects and products but also for the human agents within the institution, constantly exercised from the past into the future. For the time account is being used not just to measure attendance but to construct objective norms of performance and targets for the future. (It is hardly surprising, then, that the workers should have dubbed their protest the "clock strike". They were doubtless aware of what was at stake.) The question then is: where had this time accountability come from?

The provisional answer we can provide comes first from Deyrup, who refers (1948, p. 169) to "an elaborate effort to equalize wages paid in private and government armories . . . in 1832, when a board of officers inspected Springfield with this purpose in mind". The strategy and terminology of this board (as reported by Deyrup) is, we feel, significant. It

divided the Armory workers into six *classes* according to the degree of *skill* and *intelligence* necessary for each occupation, and established for each group a *standard* wage for a ten-hour day, capable of being earned by a workman of *average* skill and energy. From information obtained from the superintendent, Master Armorer and inspectors, from questioning the workmen, and from examining the Armory's pay-roll the board made recommendations as to appropriate piece-rates and the number of pieces which should constitute a good day's work (emphases added).

Meticulous examination of records, officials and men: division into classes according to skill and intelligence: the construction of standards, averages and norms. This is not a discourse found in the armories before, but familiar from Thayer's West Point.

The connection would appear to be the man who reported for the board, Daniel Tyler. Tyler entered West Point in 1816, just before Thayer's arrival, and graduated in 1819. Therefore he ex-

perienced the whole process of transition to a modern graded, classified system of human accountability. He was present when the system encountered its first major resistance (as we said above, resistance to disciplinary power is never restricted to workers).<sup>17</sup> Tyler was one who opted to compromise with and eventually internalize the new positive power of disciplinary accountability. He graduated as a top student and with his knowledge of French (the text-books imported from the *École Polytechnique* had not yet been translated) he personally translated a French work on drill published in 1824. This led to his being sent to study at the French artillery school at Metz in 1828 where he translated their latest manual of instruction for the U.S. army. While there he also inspected the work practices and technical advances of the French armories, with the result that he was appointed to the Ordnance Corps on his return (in 1830) and given a newly-created position as Chief Inspector of Contract Arms.

This post was designed in part to relieve Lee of the supervision of outside contractors, which he had undertaken in addition to his superintendency responsibilities (Smith, 1981, p. 79). However it needs to be seen as one part in a wider disciplinary reorganization put in motion by Bomford. By 1829 he had achieved a micro-technological breakthrough with the standardization of all armory and arsenal accounts (Smith, p. 74), and the appointment of Tyler in a sense derives from that, since a new level of financial comparison was rendered feasible across the network of armories and contractors. Then in April 1832 Congress passed a bill revoking an economy measure of 1821 which had merged the Ordnance Corps with the Artillery. This enabled Bomford (who had pressed repeatedly for such a bill) to develop as Smith puts it (p. 80), "a decentralized managerial structure"; in June he appointed Talcott as Inspector of armories, arse-

<sup>17</sup> In 1818 a petition (or in Thayer's eyes, "mutiny") was made by five cadets against the Commandant, Bliss, for excessive disciplinary zeal. Thayer responded by dismissing them for forming a "combination", a dismissal which ultimately stood despite a directive from President Monroe that they should be reinstated (Fleming, 1969, pp. 40-42). The combination was the last throw of those who had been trained as "gentlemen" under the superintendency of Captain Alden Partridge.

nals and depots to work alongside Tyler, and it was at this point that Tyler's pathbreaking inspection of Springfield took place. That inspection needs therefore to be viewed not just as an "effort to equalize wages" but as a first demonstration of what could be achieved by men familiar with technologies for a full accountability over objects and persons.

In 1834, following in the pattern set by Thayer's extensive and meticulous printed *Regulations* for the Military Academy, the Ordnance Department published its own official *Ordnance Regulations*, which

- (1) carefully delineated lines of authority and communications between the chief of ordnance, his representatives and working personnel in the field.
- (2) set standards for uniformity of accounting and manufacturing practices and established explicit guidelines for such other matters as employee housing, travel allowances and work discipline (Smith, p. 82).

In this way the network of pre- and post-Thayer West Pointers combined forces (and micro-technologies) to implement a new generalized accountability system *and* a clearly articulated management structure (of the kind that Chandler has done so much to show developing on the railroads). The West Point connection with the latter we shall come to in the next section. However, without anticipating our argument there too much, we would suggest that it should not be found surprising that similar organizational principles should be adopted in these apparently independent and different economic organizations. The point of conjunction between them is West Point and its grammatocentric disciplinary technologies. Thayer's system worked insistently and surreptitiously, in a phrase of Foucault's, on "the soft fibres of the brain" to create a cadre of calculable men, and did so, to the best of our present knowledge, more comprehensively than any comparable institution of its day. Tyler, Talcott and the other post-Thayer graduates are not, on our analysis, simply "great innovators"; they are representatives or signs of the operation of a new kind of disciplinary power.

## WEST POINT AND CORPORATE MANAGERIALISM: THE RAILROADS

### *The railroads and the problems of multiunit organization*

In Chandler's words (1977, p. 75) "modern factory management (but *not*, it must be stressed, the management of large modern multiunit enterprises) had its genesis in the United States at the Springfield Armory". It seems to us that we can now bring closer together the genesis of factory management and that of multiunit enterprises and form a new overall historico-theoretical picture of the two developments. As the West Point connection engendered one new form of disciplinary accountability over men and objects within the factory, so it engendered another form in what was to become the large multiunit enterprise. We intend, in this section, to amplify our earlier analysis (Hoskin & Macve, 1986, pp. 130–132) in order to show more clearly how the West Point system came to produce a new kind of managerial accountability structure on the railroads.

Chandler's analysis stresses the interplay between technological breakthrough (i.e. the potential opened up by new transportation and communication systems, the railroad and the telegraph) and the actions and reactions of "a new type of businessman", men who were mostly "salaried employees with little or no financial interest in the companies they served" and who mostly "had had specialized training" as civil engineers (p. 95). (Even here the classic motive of economic rationalism, the self-interest of the capitalist, is virtually absent.) He stresses that they faced "unprecedented challenges" for which "the operation of the early canals and turnpikes provided few clues". Even the early railroads offered little help since "the superintendent and his functional assistants worked out of the same office" while the treasurer kept the books "in a strictly mercantile style . . . by double entry" (p. 96). Transport coordination was a minimal problem: there was only one track and on most lines trains "ran one way one day and the other way the next" while on the busy Boston & Worcester line where three trains per day

ran in each direction they left each terminus at precisely the same time and met at the midpoint, Framingham. Neither train moved on until the other had pulled in. The first complication in scale came with the opening in 1840 of the first intersectional road, the Western, running from Worcester to Albany.

*The railroads: managerial innovations and the growth of "cost accounting"*

The new kind of managerial accountability structure which creates the multiunit enterprise manifests certain differences from that of the factory. In the full-fledged structure Chandler identifies two main components of difference:

(1) the articulation of clearly defined reflexive relays of command and communication up and down the lines; this he attributes mainly to Daniel McCallum, general superintendent of the New York and Erie line, although he drew from

"the organizational form developed on the Western (by Whistler) and the Baltimore & Ohio (by Benjamin Latrobe)" (p. 101). McCallum was appointed general superintendent of the New York and Erie in 1853 and reorganized the administrative structure so as to "insure a more precise accountability and control over expenses and a more effective appraisal of men and managers" (ibid.);

(2) the decentralized separation of "line and staff" functions "by which the managers on the line of authority were responsible for ordering men involved with the basic function of the enterprise, and other functional managers (the staff executives) were responsible for setting standards" (p. 106): he attributes the most significant development of this principle (which we shall call "divisional" organizational structure<sup>18</sup>) to J. Edgar Thomson in his organization manual for the Pennsylvania Railroad in December 1857.

<sup>18</sup> A multiunit enterprise (e.g. a railroad comprising several geographical divisions) has two basic aspects of the relationships between managers in the divisions to deal with. How do they relate to their divisional head and how to their functional head? A "departmental" structure (the "natural" structure (Chandler, 1977, p. 107)) has those responsible in each division for functional areas (transportation, motive power, maintenance of way, passenger, freight, accounting) reporting directly to their functional superiors in the central or "head" office, with a chief executive having control over the whole structure. In a decentralized "divisional" structure, the functional managers in each division are responsible to the *division* superintendent and he is responsible (like the heads of the other divisions) to the general superintendent. Supporting this chief executive are the functional heads (the "staff") who set standards and with whom the functional managers in the divisions have a professional, but not a line of command, relationship. This is Chandler's "line-and-staff" organization [the modern term being "divisional" while the "departmental" structure is called "functional" (e.g. Khandwalla, 1977, pp. 489ff.)].

But either of these solutions can only be partially successful: there is always a tension between the functional manager's dual responsibilities to his own division and to his "professional" specialization. Mixed solutions, such as the "systems" or "matrix/project" organization attempt to reconcile these tensions by articulating them explicitly in the structure. But no solution is wholly satisfactory and at different levels or in differing parts of the organization different forms may be adopted. [Takatera & Nishikawa (1984) report the early Japanese example of the banking and trading House of Mitsu at the beginning of the eighteenth century which had an overall divisionalized structure: the banking business then having geographical subdivision (with profits calculated individually for each banking shop) while the chain of silk fabric shops was subdivided along functional lines (with profits calculated for the chain as one unit).]

From our perspective the key nineteenth century U.S. innovation is that of recognizing and articulating the need for a conceptually clear "grammatical" organizational structure for large scale multiunit enterprises in the industrial arena; in particular articulating the role of the chief executive and his senior functional officers, their lines of responsibility and the detailed reporting required. Thus the particular *form* of "solution" adopted may have been less significant: while the 1857 reorganization of the Pennsylvania finally introduced a "divisional" structure, McCallum's well-known and much-praised prescriptions on the Erie had retained a mixture of the "divisional" and the "functional". (See further Appendix C.)

Another structural question is the role of the head office. It may be desirable to separate "head office" from day to day routine management through the delegation of authority so as to free the chief executive to be more concerned with questions of strategy and standards. This can be more readily achieved under a divisional structure, but it may be achieved under a functional structure too. It is the former structure that has been associated with the success of the giant twentieth century U.S. corporations (and been exported to Europe) but for this too a necessary basic condition has been the development of adequate management accounting systems for internal communication (e.g. Johnson, 1978).



All of this was new in American business, and it created the conditions wherein a new kind of systematic accounting was developed. In Chandler's analysis, this qualitatively new flow of information via relays in a carefully delineated authority structure "contributed substantially to the emergence of accounting out of bookkeeping" (p. 109).<sup>19</sup>

In our reanalysis of how this new managerialism developed, we would emphasise two major theoretical points. First we can accept that the outcome is a general accountability system which is able to activate a double concern with constant profitability and economy across the whole field of an enterprise — the human dimension as well as the material. But we would point to the context within which this developed. It was not a purely economic process or discourse. Indeed the railroad cost accounting system that finally emerged under Fink (see Appendix C) was, even in the 19th century, subjected to criticism by economists for being "impracticable", and since that time the conventions and calculations involved have continued to be questioned on fundamental grounds:<sup>20</sup> while they construct a rigorous control and evaluation system, it remains the case that such accounting technologies have not ceased from being questioned in the terms of theoretical economics (e.g. Wells, 1978, pp. 114–118). Putting it baldly, such systems might be measuring the never-before-measured, but can they be justified as measuring "the right thing"?

We are suggesting that part of the difficulty found in justifying such systems in economically rational terms lies in the fact that they were generated from an extra-economic (i.e. disciplinary) discourse. This to us is not just a historical

observation but a historico-theoretical one which crucially modulates the requisite terms of analysis. Cost accounting's historical genesis constitutes a critical part both of its subsequent success and of its questionability.

This observation forms part of a general first point about the need to consider or reconsider the genesis of this managerialism. Chandler himself seems to acknowledge that explanation must go beyond the confines of a narrowly economic history. There is firstly the fact that the innovators were mostly employees with little or no financial self-interest in their innovations. Secondly we have his concluding statement (p. 120), that "the innovations made . . . in organization, accounting and control went beyond mere necessity. The railroads could have operated well enough with only rudimentary organizational structures, without the line and staff distinction, without an internal auditing staff. . . . Indeed many roads continued to operate for many years in an ad hoc informal way."

Some kind of power-knowledge analysis therefore seems appropriate and to us the process of innovation appears to be *essentially* disciplinary: in the power aspect because of the meticulous deployment of hierarchical and reflexive relays for command and communication coupled with the use of a number-based normalizing judgement; in the knowledge aspect because of the way in which accounting and managerialism quickly take on the attributes of an academic discipline.<sup>21</sup> The development of this whole disciplinary nexus where power and knowledge practices intertwine must, we suggest, be kept in view in future research into the genesis of corporate managerialism. (This is, perhaps only to underline that we are confront-

<sup>19</sup> See Appendix C

<sup>20</sup> The theoretical limitations of cost accounting were of course applicable *a fortiori* to the later development of "profit center" accounting and responsibility as the same cost allocations are necessary together with further assumptions about revenue allocation and the asset base (e.g. Solomons, 1965).

<sup>21</sup> We note particularly the development in the 1850s of quasi-academic journals like Poor's *American Railroad Journal* and the *Banker's Magazine* as vehicles for analysis and theory, and the fact that the West Point men are professionally and academically qualified, if only in engineering; within a few decades, of course, there would be autonomous professional/academic qualifications in both accounting and business management.

ing here more than a new economic regime, in fact a whole economic, political and cultural apparatus which disciplines via self-discipline.)

Our second point is that historically the West Point connection would seem to have a special call on our attention. As with the factory innovations at Springfield, so it is with this managerialism. West Point offers a precedent for the kind of accounting and organizational strategies introduced, as well as training some of the key innovators. This, to us, is why "mere employees" became the innovators and went beyond economic necessity: they were implementing the disciplinary system which they themselves had internalized — a system which happened to have accountability built into it at every point.

*West Pointers and railroad management:  
Whistler and the Western railroad*

In our interpretation George Whistler plays the key role as intermediary in the genesis of accountability between the West Point system and the railroads, analogous in importance to that of Tyler at Springfield. Thus we diverge in several fundamental respects from the analysis put forward by Chandler. He pays attention to the Military Academy only with respect to its technical training in engineering, and in general feels, despite his concession to the Ordnance Department and Corps of Engineers as "professionally manned, hierarchical organizations", that the practices and procedures of the military bureaucracies had little to offer industrial management. Thus his conclusion: "of the pioneers in the new managerial methods only two — Whistler and McClellan — had military experience, and they were the least innovative of the lot" (p. 95).

This thesis has not been universally accepted. For example, Hall (1982, p. 232) still argues that

the greater part of the problems appear to have been solved by men with collegiate, and *most importantly* mili-

tary training. As primitive as the military art may have been as practiced in America, it was the only body of knowledge that dealt with the control of masses of men, with large budgets, and with efficient allocation of resources (*emphasis added*).

Nevertheless, in our view the key influence was the, easily overlooked, new regime emanating from the *pedagogic* arena. It was the *Academy* which was indeed the most important background for it provided the power-factor in its power-knowledge innovations. This was particularly the case with Whistler, the man who dealt with the first managerial complications of scale — on the Western.<sup>22</sup> The system that he devised for the Western in 1841 clearly introduced the first principle of the new managerialism (the clearly defined relays of command and communication).

Complications of scale had set in when the Western became the first intersectional railroad. There were three trains running in each direction daily "on a single track, without benefit of telegraphic signals, through mountainous terrain" (Chandler, p. 96). This led to a series of accidents, culminating in a head-on collision on 5 October, 1841 with two fatalities. The press and the Massachusetts legislature called for action which led to a "Report on Avoiding Collisions and Governing the Employees", authored principally by Whistler (Salsbury, 1967, p. 185) and presented on 30 November.

As we have noted before (Hoskin & Macve, 1986, p. 131) since the committee responsible was only convened on 15 October, this blueprint for reform was produced in only *six weeks*. It is surely a significant question how Whistler created such a comprehensive new structure when there was no model in the business world to draw upon. The details of the scheme fixed, as Chandler says, "definite responsibilities for each phase of the company's business, drawing solid lines of authority and communication for the

<sup>22</sup> Incidentally we wonder whether Chandler himself might now wish to qualify the judgement above (which was originally made in an earlier piece (Chandler, 1965, p. 39) in virtually the same words, except in the singular about McClellan only). As a judgement on McClellan's contribution it seems unexceptionable but it cannot be applied in the same way to Whistler, given Salsbury's (1967) research on the Western Railroad, which identified Whistler's contribution and effectively pushed back the dates of managerial innovations by some ten years from the early 1850s (compare how Latrobe's role was described in Chandler, 1965).

railroad's administration, maintenance and operation" (p. 98).<sup>23</sup>

Regular reports were passed up each of these lines of command to the headquarters officers and detailed regulations were passed down stipulating precise areas of responsibility and modes of action. For instance each roadmaster had to keep a "journal of his operations" and make a monthly report to the Chief Engineer. The station agents had to make detailed reports of tickets sold, freight received and fuel procured to the assistant masters of transportation. And the operating men had to operate under "careful and explicit rules" (Salsbury, 1967, p. 187). Precise timetables were set up and further regulations introduced to ensure clear limitations of duty for safety purposes.<sup>24</sup>

#### *Thayer's "organizational structure" at West Point*

We now examine how West Point forms a precedent for these organizational innovations. In respect of the railroads, the connection is not precisely the same as with the armories. In the

latter case the marking and archiving innovations are the crucial ones, yet here we are confronted with a rather different development, the deployment of precise relays of command and a separation of administrative powers, i.e. an extension of the disciplinary system already in place. This in fact was an elaboration of the Thayer system which was introduced only in 1821–1822, i.e. after Tyler had left, but, significantly, when Whistler was there, in a position to appreciate and internalize the full significance of what was being introduced.

George Washington Whistler graduated in 1819 in the same class as Tyler, having distinguished himself as a draftsman. In 1821–1822 he was therefore brought back to the Academy as Assistant Teacher of Drawing, and while he was in post the most serious overt rebellion against the Thayer regime took place one night in December, 1821.<sup>25</sup>

We have described Thayer as the archetypal "grammatocentric" man (Hoskin & Macve, 1986, p. 131). Even before this near-disaster he had manifested a clear preference for administ-

<sup>23</sup> In the original scheme three operating divisions, geographically contiguous, were set up under a headquarters located at the midpoint of the line, which happened to be Springfield. (This seems an additional issue to research — whether this geographical coincidence hides yet another social network of West Pointers: Ripley was by now in post at the armory, and some interchange of ideas with Whistler is certainly not out of the question.) However Whistler's scheme went beyond the organizational problems of the armory. He had to create relays which would both divide and reconcile the organizational and informational demands of his three divisions. As Chief Engineer he drew up a system where, as Salsbury puts it (1967, p. 187), "at the apex of power just below the President was the Chief Engineer . . . who held ultimate responsibility for maintenance of track and structures". The Chief Engineer was therefore the key man (after Whistler's departure for Russia in 1842 he was retitled the Superintendent). In addition there were two other officers at headquarters with their own divisional underlings, the master of transportation and the master mechanic, but they were answerable to the Chief Engineer. Thus there was a managerial structure, as Chandler says, with "two middle managers — the master of transportation and the master mechanic — and two top managers — the superintendent and the president" (p. 98). Yet the latter was not a full-time officer until 1852, which reinforced the central power of the Chief Engineer/Superintendent. Below this structure there then spread out, by division, three groups of employees: road-workers (in construction and repair of track) under the roadmasters; transportation men (station agents, conductors, engineers and rolling stock maintenance men) under the assistant masters of transportation; and mechanics (repairing engines and rolling stock in the shops and roundhouses) under divisional senior mechanics.

<sup>24</sup> Here were the hierarchical reflexive relays of command and communication, sure enough. There was not, however, a clear line-and-staff division, or so it seems, for, Salsbury remarks, "the directors left much to the discretion of the administrators" (ibid.) and the structure appears essentially functional. However, once more, until the records are searched with that in mind the question must remain moot.

<sup>25</sup> Some cadets (showing the benefit of their military training) set the Mess Hall ablaze; but this was merely a diversionary tactic as in the ensuing mêlée they dragged a cannon to Thayer's recently-completed Superintendent's Residence, loaded and lit it, retiring immediately. The following morning it was discovered, the fuse half-burnt (Fleming, 1969, p. 50). Thayer's response — the culprits being concealed behind a wall of silence — was to prevent any such future occurrence by creating a new organizational structure. It is the detail of this structure which compels attention.

ration in writing over personal confrontation. The total accountability system is one sign of this. In addition he had chosen to issue his orders in writing through his Commandant, who thus was the primary target for disaffection, as in the Bliss incident of 1819 (see again footnote 17). Even dismissals were issued in this way and read out at morning parade by the officer of the day as a list of "resignations accepted very much to the astonishment and dismay of those whose names were mentioned". The victims became known as "forced volunteers" (Denton, 1964, p. 180). But from this point on he retreated decisively behind the shield of writing.

His new organizational structure served this end in two complementary ways: first it created a set of divisions within the Academy, each with its clear line of written command and relays of constant written communication and report; second it created an organizational separation at the top level. The divisions reported exclusively to the Commandant, while the Superintendent (whose office comprised Thayer and his personal clerk) set the rules, collated the information and "operated only as a court of last resort in the chain of command" (Fleming, 1969, p. 50).

In detail the system operated as follows. At the top of the line was the Commandant, Worth. The Academy was then divided by its barracks, North (with the taller half of the cadets) and South (with the shorter), and into the barracks were installed two of the Assistant Instructors of Tactics as Superintendents. Subsequently each barracks was subdivided in two, giving four companies of cadets, which then required the allocation of four Instructors, each "to superintend a company of Cadets and the Division of the Barrack in which such company may be quartered". These "Superintendents of Divisions" had to attend all parades, roll calls and drills, inspect the rooms "at least twice every day and frequently at different hours of the night" and generally see

the regulations "duly observed" (United States Military Academy, 1832, p. 40). Each in turn was appointed Officer in Charge for the Day with special responsibility accordingly. Finally each had to make "every morning . . . to the Commandment of Cadets a report in writing of all delinquencies that may have come to his knowledge since his last report, and of the condition of the rooms under his charge in regard to police; specifying those in the best and those in the worst order and the names of their Orderlies". In addition, as Officer in Charge these Superintendents had to append an extra report to the regular one.<sup>26</sup>

Beneath the Division Superintendents was a hierarchy of commissioned and non-commissioned Cadet Officers, selected from those "most active and soldier-like. . . and most exemplary in their general deportment" and with the senior commissioned Officers generally from the first class. Each division was further sub-divided into two, with a senior Cadet Officer appointed Superintendent of each sub-division. These Superintendents had direct responsibility for "noise, scuffling or other improper conduct", for the appointment of weekly Orderlies and subsequent daily inspection of their work; they too had to make a daily report in writing, to their immediate superiors, the Division Superintendents, for forwarding up the line. There was also at this level an equivalent to the Officer in Charge, entitled the Officer of the Day (chosen from all the officers plus any other members of the first class) who was responsible for all the minutiae of the orders of the day and their proper execution, including chasing up and reporting any absentees. This officer also had to file a general guard report at the end of his day, detailing all violations and absences. Beneath the officer level was a hierarchy of cadet Sergeants.

The system did not stop there, for the individual cadets were implicated in further writing

<sup>26</sup> These regulations first appeared in the Post Orders for 23 February, 1822 and were then incorporated in the 1823 edition of the Regulations (which is almost double the size of the 1821 version — 40 pages as compared with 23). It is the meticulousness of prescription which makes the difference.

if in any respect they wished to object to or deviate from the prescribed routine.<sup>27</sup> *In toto*, then, this was an exhaustive hierarchical reflexive system of command and communication, a system which (ideally) made every individual in the institution constantly visible and accountable for his behaviour.

The fundamental similarities to the system developed for the Western in 1841 are close indeed — the comprehensive and complete division of responsibilities into hierarchical relays, the careful allocation of duties to avoid duplication and confusion, the constant grammatocentric exercise of power and extraction of information through writing. And Whistler, of course, was present at its inception, even if he was not, as a Drawing teacher, directly involved in its daily operation. However, against that, we would point out that he was directly involved in a parallel *academic* structure, and that this in turn was not untouched by the demands of the policing system. Thayer had by this time set up a clear educational hierarchy.<sup>28</sup>

The academic instructors themselves, therefore, were constantly accountable to their superiors for their own actions and, noting the following (United States Military Academy, 1832, p. 31) — “Teachers will be held accountable for the regular and orderly conduct of their respective classes or sections” — for those of their students too. They were required to be a supplementary policing agent (p. 31), whose duty was if “knowing to (sic) any violation of the

Academic rules and regulations, or to any crime, irregularity, neglect, or other improper conduct of which a Cadet has been guilty, to report the same without delay to the Superintendent”. At the same time, of course, they had to keep their daily accounts of class performance: as the Regulations put it (p.17), for each class they “shall keep daily notes of its progress and relative merit; and at the end of each week shall report thereon to the Superintendent, according to form B.”

Right at the top of this power-knowledge system, administering both the behavioural and academic structures but taking no direct part in either as policing agent or teacher, sat Sylvanus Thayer. *Qua* power-knowledge structure, this is reminiscent of nothing so much as Foucault's “Panopticism”, so called on the model of Bentham's Panopticon (Foucault, 1977, p. 195) — a total architectural design for visible subjection and invisible supervision, where an observation tower which cannot be seen into dominates and looks out onto every square inch of the institution and all its inmates (prisoners *and* guards, soldiers *and* officers): the difference of course is that this *panopticism* is grammatocentric not architectural; but the similarity is that the circulation of power far from being decentered and diffused, is all referred to the invisible and central eye. Even the students recognized the change: one wrote years later: “we had seen Captain Partridge everywhere . . . he was very much his own police agent. Thayer we never

<sup>27</sup> Complaints about food were to be communicated to the Superintendent of the Mess Hall (food control had a separate hierarchy of table-squads commanded by a first and second Carver who answered to the Superintendent and his Assistant Superintendents who in turn answered to the Inspector of Commons, who happened to be the Commandant of Cadets). The Mess Hall Superintendent then submitted a report (with a sample of the provisions complained of) to the Commandant in his Inspector's hat. Permits for visits to the local hotel or to local families and for leaves of absence or furloughs all had to be made by the individual in writing giving specific details of time, place and persons involved. Even excuses proffered for reported delinquencies had to be “in writing, in the form prescribed” and handed in to the Commandant for referral to the Superintendent “within his first orderly hour after the publication of the report on parade” (United States Military Academy, 1832, p. 50).

<sup>28</sup> At the top was an Academic Board composed of the Professors and Principal Instructors in the various subjects with Thayer himself as President, responsible for choice of class-books, syllabus and improvements in the same. The academic staff themselves were ranged in five ranks (United States Military Academy, 1832, p. 4), and were subject to a prescribed “Manner of Giving Instruction” (United States Military Academy, 1832, pp. 15–18), teaching in general to streamed sections, under a general surveillance from the Department heads who (p. 17) ‘in order to ascertain the proficiency of the sections intrusted immediately to their assistants and the manner in which their duty has been performed, shall occasionally instruct the sections’.

saw. We know that he occupied his quarters and from there frequently issued orders. . . ." (Denton, 1964, p. 177).<sup>29</sup>

He had largely separated himself from the everyday action the better to know and control the whole scenario. He was of the institution yet above it, answerable only to his non-executive "Chairman", the Commandant of the Corps of Engineers in Washington who was the Academy's Inspector. His role is summed up in the job description he wrote for himself in best approved impersonal style in the Regulations under section one, "Organization" (United States Military Academy, 1832, p. 3):

A permanent Superintendent . . . will have the immediate government of the Institution, and be held responsible for its correct management. He will direct the studies, field exercises, and all other academic duties; and all Professors, Teachers, Academic Officers and Cadets, shall be under his command. He will render all returns, estimates, and communications concerning the Institution to the Inspector.

He was, in short, as the responsible chief officer, subject even himself to ultimate accountability, not above it, but at the same time he was distanced from all the specific responsibilities and accountabilities which were exercised within the lines of command and communication, both academic and behavioural. This system was, so far as we can tell, *sui generis*. It departed on the one hand from all prior practice within the Academy, and on the other hand had no analogue within the wider military system.

Therefore Whistler was initiated, both as student and teacher at West Point, into the various possibilities of the hierarchical reflexive system of control and information-flow, and in general we suggest that West Point provided the model

upon which he drew when confronted with the organizational problems of the Western in 1841 (though how precisely he pursued the analogy is not clear). Again we hope in future research to make the justification for this connection stronger.<sup>30</sup>

It is, then, something of an irony that his appointment to the Western in 1837, along with two other West Pointers, Major William McNeill and Captain William Swift, was resisted by at least one Western director, Francis Jackson, precisely because they were unfit for the "real world". Jackson wanted, as he wrote in a minority report to the Board (Salsbury, 1967, p. 161)

free choice among our practical and intelligent working men in preference to confining the choice to the graduates of West Point, who . . . are notoriously unfit for the practical purposes of general direction and superintendence of such a work. It cannot be expected that any institution can take boys from the lap of wealth, luxury and idleness and fit them for the duties of such an enterprise.

Assuredly he did not realize just what kind of institution it was. Our analysis suggests that the genesis of a new total system which deployed both micro-technologies of "objective" accountability and a meticulous hierarchical organizational structure is to be found in this marginal "unreal" pedagogic institution; and than once it was internalized and exported by the institution's graduates, the "real world" would never be the same again.

#### *Haupt and the Pennsylvania railroad*

This new genealogy of corporate managerialism is reinforced by the Haupt case. Soon after graduating from West Point in 1835 he resigned from the army and worked as a draftsman

<sup>29</sup> Formal contact with Thayer was restricted to occasional interviews where he would disconcert those summoned by apparently knowing their personal details intimately despite the lack of personal acquaintance. In fact, from the files and archives accumulated he had an individual dossier on each and got his clerk to prepare an abstract on slips of paper which were then pasted inside the pigeon-holes on his desk where he, but not they, could see them (Hoskin & Macve, 1986, p. 131). It was a classic exercise of panoptic, grammatocentric power.

<sup>30</sup> At this point what we can say — in a kind of negative justification — is that it is hard to see where else he can have encountered such a system, since none has been discovered from this early period in the "real world" of business, and after leaving West Point he worked exclusively as a surveyor and engineer, excepting a visit to England in 1828 to examine railroad operation and equipment. [It also seems doubtful that he learned much there, since nothing so sophisticated is known in early English railway management (Pollard, 1965).]

before opening an Academy in Gettysburg in 1839, which he ran for six years. This is also the period when he did his first research into bridge truss design, publishing a pamphlet 'Hints on Bridge Construction' in 1842, to be followed by his *General Theory of Bridge Construction* in 1851, a work which became the teaching text at West Point and elsewhere. Thus he appears to have begun on a career-pattern not untypical for the period, as a man with a specialist knowledge pursued in his spare time while running a school (though it will be interesting from our perspective to discover how far he followed West Point pedagogy and discipline in that school). However when one then takes his work on the Pennsylvania into consideration as well, one gets a pattern of activity very similar to Whistler's: both of them lived an achievement ethic which manifested itself across a range of interests which involved power-knowledge relations; they were equally at home working on the material world in the controlled construction of sophisticated objects or intervening in the social arena and reorganizing human subjects; and both had an early taste of pedagogic power.<sup>31</sup>

Examination of the detail of Haupt's achievement on the Pennsylvania appears to require considerable modification of Chandler's evaluation of J. Edgar Thomson's role. The railroad was chartered in 1846 and Thomson hired from the Georgia railroad to be its chief engineer; Haupt, who was still teaching at Gettysburg (though now at Pennsylvania College which had taken over his Academy), was turned down for an engineering position, presumably because he had

little professional track record (Ward, 1971, p. 75). It was Thomson who hired him a year later, first as a surveyor and then, after he came to appreciate Haupt's bridge-building skills, in a new post as principal assistant engineer from the spring of 1848; in this capacity he was left in complete charge of building a bridge across the Susquehanna.

The point here about Thomson is that to this date he implemented no new managerial organization or accounting control and he left Haupt to his own devices. But Thomson's prior experience hardly prepared him for anything else.<sup>32</sup>

The two men apparently became close collaborators (Ward, 1971, pp. 77-78; 87). One of their few areas of disagreement was over rate setting in the early 1850s (Ward, 1971, p. 81). Thomson, with his small-time background, favoured a fixed "high toll on a relatively low volume of freight"; it was Haupt who studied the current volume of freight, "analyzed the fixed and variable costs . . . and determined that the rates could be drastically lowered so that even bulk produce might be carried at a profit for as low as six or seven mills per ton mile": and when he could not at first convince the board to go below fifteen mills or shift the company policy of keeping to a uniform toll sheet, he was the one who took it on himself to operate a "flexible system attuned to local conditions", discounting the rates "for larger shippers originating freight with the road, for those who shipped in carload lots, or for those who gave him some backhaul business" (Ward, pp. 81-82). Thus Haupt appears to be the key intermediary in the establish-

<sup>31</sup> Haupt was a generation younger than Whistler, and there is no evidence to suggest they ever met personally: he was born in 1817, entered West Point in 1832 (Thayer's last year there), and graduated in 1835 at the age of 18. By the time he got involved in railroad management in the late 1840s, Whistler had been in Russia working for the Tsar for some seven years and was close to dying of cholera.

<sup>32</sup> The Georgia railroad was a low-volume line "which ran through sparsely settled agricultural country" (Ward, 1971, p. 81); Thomson himself, born in 1808, had learned his craft from his father and worked for the early and small Camden and Amboy Line before being appointed Chief Engineer on the Georgia Line in 1832, following his return from a trip to Europe to observe railroad practice there (particularly the work of George Stephenson). There was nothing in this background or experience which would discernibly prepare him to lead a managerial revolution: on the contrary, his fifteen years on the Georgia seem to have enhanced his reputation as an engineer, but little else. Chandler (1956, p. 38) does however note that Poor's *American Railroad Journal* approved of the full annual reports that were published for some lines, like Thomson's for the Georgia and Latrobe's for the Baltimore & Ohio (although the citations refer to those of the latter line and their contents are not described).

ment on the Pennsylvania of a policy of using meticulous cost accounting data as the predictive basis for decision making for profit. Ward suggests that he was "one of the first men in railroad history to make a serious inquiry into the actual costs of transportation" (ibid).

We can therefore ask, first, what was Haupt's role in the development of accounting on the Pennsylvania [where, on Chandler's account, "J. Edgar Thomson and his associates on the Pennsylvania Railroad made the most significant contributions to accounting" (1977, p. 109)] and, second, what was his contribution to "Thomson's" organizational changes?

As to accounting, McCallum was meanwhile developing his own ideas about the need for a costing system [on the New York and Erie line (see Appendix C)]. But it is not obvious that the developments on the Pennsylvania derived from his work. Although he was appointed general superintendent on the New York and Erie in 1853, his first major pronouncements occur in the Annual Report of 1855. Haupt, on the other hand, was already working on his costings in 1853 (if not earlier). Given this prior work by Haupt, it appears more likely that the new attention to accounting on the Pennsylvania was internally inspired. By 1851 operational data were being included in the Annual Report and these increased over the next few years (Chandler, 1977 p. 110). We know how sophisticated the accounting office was when Thomson reorganized it in 1857 (after Haupt had finally resigned from the Board in 1856): but Haupt, after his original independent initiative, must have continued to influence these developments during the intervening years.<sup>33</sup>

Such a conclusion is strengthened when one

considers, secondly, the beginnings of the transformation of the Pennsylvania's organization structure. In February, 1849, Haupt was promoted again, to another newly created post as Superintendent of Transportation; his first task was to inspect the northern railroads, including the New York and Erie and also the Western, whence he returned with "copies of all their business forms and freight rates, outlines of their personnel practices (and) information on their organization" (Ward, 1971, p. 78). He and Thomson then drew up their new organizational plan, "unsophisticated by later standards", as Ward puts it, but directly derived from earlier best practice (in which of course the Western had been pioneer). Four separate departments were set up (following the Western model of three) transportation, track maintenance, motive power and car maintenance (thus the earlier mechanic department was sub-divided into two): Haupt himself became the focus of a central staff office, with direct powers of supervision over the departments and in addition "responsibility for general office accounting, for disbursements for materials and labor, and for personnel policies" (Ward, ibid).

This then was still not a decentralized divisional structure: Haupt, on the contrary, like Whistler had created a departmental ("functional") structure with a central office where all activities all flowed back to, through and out from himself.

Haupt's *modus operandi* for the next three years, until 1852, proves to have been uncannily like Thayer's, both in the grasp of the broad possibilities of this grammatocentric panopticism and in its fascination with obsessional detail.<sup>34</sup> The next change in the railroad's organization

<sup>33</sup> They had "by 1857 (the year Thomson reorganized his accounting office) 144 basic sets of accounting records" (Chandler, 1977, p. 110) — compared to the four or five sets of the typical textile mill. And instead of semiannual compilation these were tabulated monthly and "forwarded in printed form by the comptroller to the board of directors by the fifteenth of the following month".

<sup>34</sup> On the broad front he began his first forays into rate-setting and transportation policy: as early as 1850, the first year of operation, he costed the toll sheet issued by the directors and suspended it because the rates had ignored certain cost factors. When his *bête noire*, Merrick, observed it was "nothing to make a fuss about", he responded "if the Board was willing to do any business for nothing and pay for the privilege I would always be found willing to carry out instructions after advising them of the facts" (Ward, 1971, pp. 87–88).

He began his analysis of costings as soon as he had data available and thereafter systematically pursued it: small wonder that



came when Haupt was, against Thomson's wishes, temporarily manoeuvred out of the company in 1852–1853: after his departure Thomson, newly made President, introduced a new organizational structure in which the Superintendent's role and influence was reduced (Ward, 1971, pp. 78, 93). But although this was a more decentralised corporate structure, it only "modified" Haupt's structure and was "quite adequate until 1857" (Chandler, 1965, p. 105). Whether it was introduced as a reaction to what was seen as Haupt's excess of power or in acknowledgement that no one else could fill the role adequately (or indeed for a combination of such reasons) is not clear. It had apparently already been propounded in the railroad's 1851 Annual Report (Chandler, 1977, p. 533, fn 42).<sup>35</sup>

Haupt returned to the company the following April as Chief Engineer, finally becoming, in March 1856, a member of the Board although, with the growing pressure of his outside business interests, he was increasingly working part-time in his engineering post and finally resigned

in December 1856 (Ward, 1971, pp. 93, 97). In 1857 Thomson finally introduced the reorganization into a "divisional" structure, creating the pattern for American corporate organization. There is however no evidence that we are aware of that the two men, who had long been allies, had markedly different views about the appropriate organization structure to adopt.

#### ACCOUNTABILITY: WEST POINT AS PARADIGM CASE

We want to end with a word of qualification. West Point represents a paradigm case — perhaps the most important paradigm case — in the genesis of a new power-knowledge configuration. Its links to the reorganization of factory management and to the development of corporate managerialism will, we trust, no longer remain hidden from history or viewed as peripheral. And if we view it as the most important paradigm case, that is because the changes

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by 1853–1854 he was advancing a quite sophisticated strategy of variable rates which took into account a range of relevant factors. But in addition, and over the same period, he turned his panoptic gaze to transportation policy: the statistics for 1851, the first full year of operation, revealed that gross income from passenger traffic was almost double that of freight while calculated costs were about half, and in addition only 42% of passenger traffic travelled west. To Haupt, then, the strategy was obvious — increase westward passenger traffic by getting into the immigrant market emanating from New York. No matter that the railroad had no access to New York City and was incomplete in the western part of Pennsylvania, he was prepared to pursue the logic hidden in the written figures but clearly readable to him, even though he had to operate his passenger strategy in conjunction with Camden and Amboy line and various state-owned railroads and canals, thus retaining only \$1.55 out of a \$5.25 through ticket from New York to Pittsburgh (Ward, 1971 pp. 82–83).

In 1854 he was foreseeing the need to link with the troubled Ohio and Indiana to secure the connection to Chicago. He could not persuade his fellow directors at the time: but later, and much more expensively, they were forced to adopt his policy (Ward, 1971, pp. 95–96).

This, then, was the broad grasp; but there was also the obsessive meticulousness. Every night "he carefully outlined the operations for the following day". He dealt with "washing the cars, paying the medical bills for injured employees" (but only so long as it was not the employee's fault), "overseeing the peddlers on the trains and even chasing the stray cattle off the track" (Ward, 1971, p. 79). Such a disciplinary system was very much in the image of Thayer's: drinking on the job was forbidden and offenders summarily dismissed at Haupt's personal decision, while those suspected had to sign a pledge of abstinence (thus Thayer had placed his grammatocentric system at the service of his personal predispositions). Given the interlinked broad vision and petty obsession, it was perhaps not surprising that both Thayer and Haupt should eventually have fallen foul of other entrenched interests. Thayer had been ousted by a clique close to Andrew Jackson and Haupt in 1852 was finally pushed into a corner in a stockholder fight over the composition of the board. Though the Merrick faction was voted out and Thomson (Haupt's ally) elected President of the railroad, Haupt during the battle had twice proffered his resignation and in September (perhaps with relief) resigned to become Chief Engineer on the Southern Railroad of Mississippi (Ward, pp. 91–93). But he returned the following April and was elected Chief Engineer by the Board.

<sup>35</sup> Its main feature was to separate the financial and operating departments, as Latrobe had first done on the Baltimore & Ohio [though in other respects Latrobe's organization was similar to Whistler's on the Western (Chandler, 1977, p. 100). (Cf fn 43.)].

that ensued — the American System of Manufacture and American Corporate Managerialism — proved historically to be economically dominant. (Part of our argument, as we suggested above, is that this ensued precisely because the grammatocentric system of human accountability and organization developed at West Point was so much more comprehensively powerful and knowledgeable than any other of the time, either in the U.S. or elsewhere.) Yet that is not to say that West Point alone created this new disciplinary culture. Even within the U.S. it was but one part, the most advanced admittedly, in a general shift to new disciplinary technologies within and beyond elite educational institutions.<sup>36</sup>

More widely, this applies with respect to other countries and cultures. West Point was not for them a great exemplar; similar strategies and proposals were advanced semi-independently. For instance Donald Reid, in studying changes in industrial labour management in France (Reid, 1983), found strategies similar to those in the U.S. armories being introduced around 1840 in the Decazeville Ironworks under the directorship of Francis Cabrol, a "talented engineer" first appointed (but then dismissed) in 1827, then reappointed in 1840. Further research may reveal that there were others like Cabrol bringing from their educational experience a disciplinary

mentality as well as technical expertise and so helping to transform the culture of industrial work in France. Certainly the French were ahead in writing texts about cost accounting in the first half of the nineteenth century (Solomons, 1968, pp. 10–16; Edwards, 1937) (although it is generally believed that these were "ideal models" rather than reflections of actual French practice).<sup>37</sup>

Similarly in England: Pollard, in an oft-quoted remark, ended his *The Genesis of Modern Management* (1965, p. 250) with the conclusion that by the early nineteenth century there was no sign of "a management science or at least a management technology". Berg (1980, pp. 181 ff.) followed this up by pointing to Charles Babbage's *On the Economy of Machinery and Manufactures* (1831) as the first sustained theoretical work in England to suggest a disciplinary reordering of both men and material within the factory (and even then it was several decades before the suggestions bore much fruit). Babbage was interested not only in the division of physical labour according to the requirements of a given *production* process (as in Adam Smith's famous pin factory), but also in the division of *mental* labour according to the criterion of skill (see chapter XX "On the Division of Mental Labour"), and so how to maximize human productivity and profitability on this dimension.<sup>38</sup>

<sup>36</sup> Yale for instance changed to arithmetical grading independently and in the same year as West Point — 1817; Harvard did so during the 1820s, largely at the urging of George Ticknor who was a college friend of Thayer's from Dartmouth days and who visited the Academy with another Harvard professor, Andrews Norton, in 1821, returning fired with a missionary zeal for a similar system in Cambridge. The graduates of these and other reformed colleges were to constitute a new generation of proselytizers for disciplinary power as they achieved positions of authority. In this respect Hall appears to make a significant point (1982, p. 232) when he says that while West Point supplied more railroad Presidents and Chief Engineers than any other comparable institution it was "followed most closely by Yale." West Point is a sign that a new power-knowledge regime was taking shape, but it did not constitute that regime purely in itself.

<sup>37</sup> Cabrol introduced a disciplinary control over piece-rates, making them subject to "constant attention and adjustments by managerial personnel in order to make certain that the company obtained maximum effort from its workers" (Reid, 1983, p. 17). It does not appear that he constructed norms to this end: however this was still an implementation of constant surveillance and judgement, as was his strategy of removing work supervision from senior workers and putting it "in the hands of company managerial personnel" (p. 16).

The French costing texts discussed by Solomons (following Edwards, 1937) were often concerned with agricultural as well as industrial accounting; and in agriculture they were even less representative of general practice (Solomons, 1968, p. 16). But the economic absurdity of many attempts to allocate costs for decision-making purposes is particularly clear in the agricultural context (Macve, 1985) and agriculture lacked the scale of industrial organization and thus the opportunity to explore cost accounting's potential for disciplining the human.

<sup>38</sup> He recounts the story of the development of logarithmic tables by the French government under the direction of Prony: the workers were divided into three sections with a skill hierarchy — the first section being "five or six of the most eminent

Here again we would draw attention to the strategic importance of Babbage's own background. He wrote as Lucasian Professor of Mathematics at Cambridge, and as a successful graduate of the grading, classifying, intelligence-glorifying Mathematical Tripos. One should only read the work on Machinery and Manufactures alongside his *Reflections on the Decline of Science in England* (1830). There is the same commitment to skill rationalization, and for the revivification of science nothing would be of more value (Ch. I) than turning it into a rigorously examined subject like Mathematics, where all students attending science lectures would be examined and then "arranged in two classes, according to their merits" so that "no young man, except his name was found amongst the 'List of Honours', should be allowed to take his degree" (Babbage, 1830, p. 5). So he concludes (p. 7): "by such an arrangement . . . we should, I think, be enabled effectually to keep pace with the wants of society."

Such connections and more are, we suggest, there waiting to be made as we attempt to expand our understanding of the generalized transfor-

mation in industrial organization, in managerialism and in the professionalization of work which affected the leading economic states of the nineteenth century. This transformation we have represented as a discontinuity, and we hope that our analysis contributes to an understanding of the specifics of that discontinuity — of how it happened and why. From our perspective the change cannot be subsumed under the rubric of economic rationalism. However, economic rationalism was without doubt one of the key precipitates of this integrated application of the micro-technologies of disciplinary power to the whole field of material objects and human subjects.<sup>39</sup>

## CONCLUSIONS

Chandler's analysis has uncovered much of the early socio-economic history of this new organizational logic of business enterprise. However, as the reservations which he has himself expressed about that history suggest, there is more to that logic than a socio-economic analy-

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mathematicians in France" who developed formulae suitable to the project, the second being "seven or eight persons of considerable acquaintance with mathematics: and their duty was to convert into numbers the formulae", while the third, "whose number varied from sixty to eighty" had the job of number-crunching to produce the finished tables, which occupied "seventeen large folio volumes" (Babbage, 1835 edn, pp. 194–195). Babbage in his way was expanding the terms within which labour and productivity were conceptualized into a technico-economic frame, where skill rationalization was a decisive factor. This indeed was one of the major justifications for the utility of his proposed calculating-engine, which would be "a substitute for the whole of the third section of computers" (Babbage, p. 195). (His views on the desirability of sophisticated cost accounting — also ahead of their time in England — have been quoted by Solomons (1968, pp. 9–10).)

<sup>39</sup> John O'Neill has recently published a similar approach to the problematic of industrial discipline, which draws attention to links between the work of Foucault and that of Weber (O'Neill, 1986, esp. pp. 46–50). He remarks that it is "necessary to avoid a naive economism when thinking of the capitalist control of the means of production. . . capitalists had also to bring themselves into line with the requirements of industrial rationalization" (p. 49); and he notes (p. 54) that we must not take for granted "the *disciplinary society*. . . that underwrites discipline in the workplace". Thus in his view Weber's formal theory of bureaucracy is a starting-point which then "needs to be complemented by the history of factory discipline, the latter overlapping with prison discipline and eventually overlaid with bureaucratic discipline": and beyond this there is what he describes as a "secondary socialization" in discipline which "it has fallen to the schools, social and medical agencies and the media. . . to provide" (pp. 56–57). This is an important contribution to a growing theoretical debate; however precise historical detail on the genesis and dissemination of the new micro-technologies of discipline is still absent from his account, which is couched in terms of the agencies of labour and capital (see esp. pp. 48–50). This, we hope, is where our account furthers theoretical debate, by showing (1) how the apparently secondary socialization into knowledge-disciplines and and the power of the norm under a regime of examination and grading is historically prior to the new relations of labour and capital; and (2) how a new discourse of accountability and a new panoptically-structured mode of organization issue therefrom, thus creating the conditions where modern economic rationalism can discover its possibilities (and contradictions).

It is interesting to note how close in the essentials of its micro-technology and the form of its calculations is modern Soviet accounting to that of "capitalist" enterprises. Bailey (1973, p. 45) comments that Soviet writers frequently refer to the chief book-keeper of an enterprise as a State inspector: he/she is "an all-seeing eye of the state administration".

sis alone explains. Why should overkill organization have been adopted? Why should it have been salaried employees who introduced it? Why should worker resistance have been channelled into accommodation? The power-knowledge analysis which we have sketched out here and which goes behind and beneath the manifest socio-economic change of the later nineteenth century can, we suggest, explain both the sudden, dramatic success of that change and the anomalies in its early implementation.

A whole new human ecosystem which went wider and deeper than any specific socio-economic system was being put into place, beginning within the sphere of elite education. A new regime of disciplinary organization and human accountability was internalized by the people who underwent that education. Some no doubt resisted it,<sup>40</sup> others equally certainly appropriated it, but none were untouched by it. They were privy to a new wide-ranging set of power-knowledge relations: subjected to a grammatocentric organizational structure, they were trained as disciplinary specialists, their ability and conduct objectively evaluated through quantified measures. These three things — grammatocentric organization, specialist differentiation and quantified evaluation — they then exported to the world of business via the armories and the railroads.

This to us explains the similarities between the innovations in these apparently separate economic spheres. Detailed, relay-based organization structure, accountability and the power of the norm did for (and to) workers and managers what they had done for and to West Point cadets and what pre-modern systems of work organization and accounting never had — engendered (1) a general compliance (and new patterns of evasion through dissimulation punctuated by episodes of disciplined group resistance) and (2) a positive power pay-off for knowledge expertise and productivity.

Thus we argue against one much stressed fea-

ture of Chandler's analysis, namely that technology was the prime mover in creating the new corporate practices. "Obtaining the full potential of the new technology" (in transportation, production and communication) did call, as Chandler says, "for unprecedented organizational efforts" (1977, p. 94), but the genesis of that organizational strategy emanated from elsewhere. It is significant that the managerial innovations on the Western predate the invention of the telegraph and similarly significant that the general spread of innovations in organization, accounting and control "went beyond mere necessity" (1977, p. 120). The history suggests at such crucial moments that the argument from technology will not suffice.

Such a transformation did not occur uniformly or discover its logic all at once. Hence, for example, grammatocentric panopticism, whose long-term result was to produce a population of calculable persons, retained at first a residue of the old construct of the "memorable man" at its heart — such was the role Thayer and Haupt carved out for themselves. However no-one could in the long run maintain an insulated position of privilege beyond the reach of reflexive accountability: in an ecosystem where lines of communication, command and control operated continuously and insistently upwards as well as downwards and horizontally — and where competition, rivalry and objectively measured success had been turned into constant factors in the individual's career — there could be no place of pure transcendence, certainly not for the salaried functionary, however exalted his or her position.<sup>41</sup>

There would be new memorable men, however, of a different kind: those who could calculatingly exploit the new logic of power-knowledge relations within the economic field to the point where they could commandeer their own corporate structure. Such men did not necessarily come from the old elite, for the new work-world, once established, could become its

<sup>40</sup> For ways in which people may "play the system" and seek to evade the disciplinary surveillance see e.g. Hoskin (1985).

<sup>41</sup> This is what Thayer and Haupt both discovered to their cost (see again fn 34).

own school in the arts of corporate managerialism and accountability, for those who could read the logic. One of the most outstanding examples, in direct line of descent from men such as Haupt, is Carnegie. In his company, in the 1870s, the monthly, then daily, cost sheets from his factories were his "primary instrument of control" and "marvels of ingenuity and careful accounting". They were effective too. As Bridge (who worked there) put it:

The minutest details of cost of materials and labor in every department appeared from day to day and week to week in the accounts; and soon every man about the place was made to realize it. The men felt and often remarked that the eyes of the company were always on them through the books (Chandler, 1977, pp. 267–268).<sup>42</sup>

Our story is not complete: there is no immediate transfer from the grammatocentric organization structure and comprehensive mathematical grading system at West Point, embracing behaviour as well as intellectual achievement, to the fully developed relays of command and systems of industrial cost and management accounting (embracing standard costing, divi-

sional performance measures and so on) of the late nineteenth and early twentieth centuries. Nor would we expect there to be. But further links may be found: for example, were McCallum's exhortations in 1855 to develop divisional costings, and Fink's later elaboration of *the detail*, their "own" ideas — or did they have West Pointers on their staff with whom they debated them?

Of course, such links may be no more than speculation,<sup>43</sup> and after the initial stage, the mechanism of transfer may well have changed. What was the effect, for instance, of the development of the "academic and professional discipline" reflected in the managerial journals in which ideas were debated and discovered by those who may have had no direct experience of elite educational institutions? What was the influence exerted by the spread of the new pedagogic techniques down and out into what increasingly became a mass schooling? Inexorably more and more of the population would be educated to internalize performance evaluations and the constant surveillance of discipline and self-discipline.

<sup>42</sup> Carnegie was hired on the Pennsylvania railroad in 1853 by a personal protegee of Haupt's, Thomas A. Scott. Scott himself had been hired as station agent at Hollidaysburg, 'a potential trouble spot' (Ward, 1971, p. 80) at the junction of the Pennsylvania with the Allegheny Portage Railroad. He proved so valuable an exponent of the new grammatocentric organization that by 1853 he had become general Superintendent, in 1860 Vice-President and finally after Thomson's death President of the railroad. Carnegie — an immigrant Scot — was to outstrip even this spectacular career. Half a century later he described Haupt as "the first 'great' man I ever knew" (Ward, *ibid*). Yet, for Carnegie, Haupt was more than a "great man"; he was the medium between a power-knowledge system and its translation into a vehicle for a new style of economic wealth and power. Carnegie, like the modern corporation and the modern power of accounting, is an epiphenomenon of this new human ecosystem.

That perhaps is why, as a new kind of "calculatingly memorable man", this archetype of the entrepreneurs (the class that is viewed ambiguously as "industrial statesmen" or "robber barons" (Chandler, 1977, p. 490)) did not totally transcend the discourse of accountability. This calculable man memorable for his incalculable wealth imposed on himself a new kind of exaction in a repayment to "society at large": which functioned both as a guarantee of further memorability and an ultimate self-justification for his transcendent success. This was the Foundation, from one perspective a modernized version of ancient philanthropy, but different from the ancient in the detail of its modernity. For it replicates the new power-knowledge relations while also extending them: in its organizational form it is a corporate managerial structure demanding ubiquitous accountability — both for the endowment itself which is to be constantly increased and reinvested to ensure the Foundation's continuance into an indefinite future and for the work done under its auspices which must contribute to (or be an investment in) the sum of human knowledge. However, it is not just any knowledge that is to be increased: only the properly accredited (and accountable) knowledge of the specialist academic discipline. In such ways does the disciplinary nexus of power and knowledge entwine its coils throughout the body politic and within the individual.

<sup>43</sup> But consider the Baltimore and Ohio, whose chief engineer, Benjamin H. Latrobe, is credited with separating the financial from the operating function in 1846 (Chandler, 1977, p. 99) and with originating the railroad unit of work, the "ton-mile". His elder brother, John H. B. Latrobe, was the railroad's counsel and had been a West Point cadet under Thayer in 1818–1821 (DAB, s.v. Latrobe).

If our thesis as to origins is accepted, how does it change our view of the development of managerialism, including the "birth of accounting out of book-keeping" in the nineteenth century? Above all we argue that it helps to explain two related, problematic features of modern accounting. First, the theoretical basis on which accounting practice purports to measure overall financial performance (by calculating "profit and loss") remains highly problematic. Yet it is a crucial feature of modern business life. On our view the imperative to calculate such measures reflects the powerful way in which the process of collecting and co-ordinating the necessary data imposes a discipline on a business organization that provides a panoptic surveillance of all its activities. Not least of these disciplinary effects, for participants, is the continuous anticipation of having their performance measured which predisposes them, in thought, word and deed, towards an internalized self-discipline.

Secondly — and again in a parallel way to examinations — while the limitations of the "profit" numbers calculated as performance measures have been repeatedly rehearsed, the history of responses to the limitations as they have been successively identified has always been to attempt to refine the measures further, not abandon them — even though the refinements (e.g. calculation of depreciation; analysis of segmental profits; calculation of standard costs; etc) bring in turn new problems of validity of a new order.

We therefore see accounting not as the "practical" response of men faced with new entrepreneurial and organizational challenges, who "sensibly" devised ways of collecting and pro-

cessing the data needed to make rational economic decisions — for in that sense no "practical" man would have invented modern accounting practice [the outputs of which are not obviously what is needed for such purposes (e.g. Macve, 1985)]. There emerges a subtle relationship between the world of the Academy and the world of practice (cf. Hopwood, forthcoming). We see modern accounting as a mode of "writing the world" which, like the modern examination, embodies the power relations and the knowledge relations of a disciplinary and self-disciplinary culture. The way in which accounting enables "performance" to be articulated has proved to be one of the most *powerful* tools for helping to create new forms of organization that have been able to coordinate business and worker behaviour and carry out economic activity on a scale previously unknown.

Simultaneously a new quality and quantity of examinational *knowledge* has been irrevocably launched and now circulates within and around the business sphere. One may operate along lines of "hard accountability" (e.g. via financial results and numerically rendered information, firing managers for "failure" as demonstrated by the "objective" outcomes) or "soft" (e.g. allowing for contextual, subjective evaluation, stressing human values and superordinate goals and opting for consensus and redeployment for "failures"). Whatever the mix of strategies the examinational eye will be constantly at work, both in the first-order appraisals within the organization and in the second- and third-order appraisals by efficiency experts and organization and accounting theorists. And beyond that, it will operate reflexively in analyses such as these.

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## APPENDIX A. THE TEXTILE FACTORIES

Chandler (1977, pp. 67 ff.) argues that a certain level of worker-discipline and simple management is worked out in this context, and Prude (1983) has gone further in a detailed study of factories in rural Massachusetts. He refers to the key part played in the genesis of the U.S. system by the Englishman, Samuel Slater. Born in Belper, in the 1760s he worked for Jedediah Strutt who used the Arkwright "water frame" production system. Worker discipline was organized round a clock-regulated 12 hour day backed up by a "system of room overseers, fines, blacklists and occasional beatings" (Prude, 1983, p. 37). Such a system owed much to pre-modern educational discipline: monitors, fines, canings and behaviour-registers were all known from the sixteenth century (Hoskin & Macve, 1986, pp. 125–126). In addition both Strutt and later Slater made direct use of a school morality; both founded schools as an extension of factory life and spoke of worker-discipline in terms derived from traditional pedagogic discourse, stressing "hard-work, temperance, punctuality and self-discipline" (Prude, 1983, p. 38).

Yet, as Prude shows, this was not a total human accountability system. Slater emigrated to the U.S. and in 1790 introduced the Arkwright system at the Pawtucket Old Mill; by 1820 it was widely copied and adapted. In many manufactures, Prude suggests, time was used as a basis for payment, workers' wages being "calculated by the number of days or, more exactly, the fraction of days they put in. . . . Transcribed (in coded shorthand) into Time Books, attendance in the Dudley Woolen Manufactory Company was recorded to the nearest three hours in the 1820s. . . . The Slater books were equally precise before 1817. Thereafter. . . the unit became the nearest ninety minutes" (Prude, 1983, p. 131). However even in the 1830s, Prude then points out, "punctuality in these mills was stressed and measured meticulously: but tardiness was not fined. Obedience to mill officials was mandated; but records of five local factory villages suggest that by 1835 only three workers had been dismissed for 'misconduct' and that 'work badly done' met only sporadic sanctions" (Prude, 1983, p. 155).

Thus no general accountability from the past into the future was deployed. It is clear that little was done to constrain



workers to take constant account of possible future consequences for past and present failures. The disciplinary system coexisted with "significant compromises", as Prude puts it (Prude, p. 130).

The production system also showed very little application of economically rational principles, either to cut costs or boost productivity. By the 1830s workers were being hired seasonally rather than being housed and found work year-round. Pay scales began to be confined "under formal guidelines designed to control production costs" (Prude, 1985, p. 121). By 1837 Slater's East Village mills determined that the "average price of all labour of every description should not be more than 35 to 37½ cents per yard". That states a rule, but whether it is a rule of thumb, based on costings, or on production rates is not clear. Certainly it does not appear to differentiate between varying labour-costs or to discriminate for worker-skill or diligence. It appears instead to be of a piece with other regulations and prescriptions — pre-modern in conception and effect. This system apparently takes old forms of discipline and accounting to their extreme, but does not, at this period, deploy any generalized accountability over workers or production.

Stone (1973) and Porter (1980) have found examples which show that the extension of the double-entry technique to integrate the recording of internal allocations and transfers of costs with the financial accounting records had been developed by some accountants in textile factories by early in the nineteenth century: by 1810 (and probably earlier) in England at the Charlton Mills in Manchester and from 1817 in the U.S.A. in the "Waltham System" mills of New England, beginning with early developments at the Boston Manufacturing Company. The micro-technology was available: but at this earlier stage the use to which this new form of information was put is not clear. Neither Stone nor Porter explain the "usefulness" of the data calculated: Stone points out that, while the "costs" at Charlton were sophisticated enough to include both depreciation and imputed interest on capital [which we note as reminiscent both of Wedgwood (McKendrick, 1970) and of some earlier English farm accounts (e.g. Macve, 1985)], the allocations of general expenses were on some arbitrary basis, which for some years left large unabsorbed balances; and the evidence for how internal "transfer prices" were calculated is not available. Porter points out that the Waltham system mills he examined did not record depreciation and, although labour and overhead costs were included in inventory, it is apparent from the examples he gives from the Lawrence company (1980, pp. 4–5) that the general expenses were allocated to each mill as a fixed proportion of the total (i.e. not on the basis of some measure of other inputs or output) and that the "unit costs" calculated for different types of cloth at each mill by the 1830s (and probably before) were simple averages of the total cost incurred for each mill based on output weights (differential unit costs *per yard* simply reflecting the relative average weights per yard). [Unfortunately the make-up of the costs — "as per Table A" — is not included in the example Porter reproduces (1980, pp. 10–11) of the "analysis of pro-

fits" by mill and type of cloth that was produced at the Lawrence company semi-annually from 1848 onwards.] Lubar (1984, pp. 24–26) does discuss the use of the figures at these U.S. mills and cites a fairly cavalier attitude by the 'agent' who ran the Lawrence mill towards the cost calculations being done in 1834. Lubar suggests that the main benefits of these early accounting systems lay in improved management communication and in the provision of a basis on which to question operating costs (for the appraisal of workers and managers) and to pay production-based bonuses.

By 1856 the Lyman mills were using various allocation methods based on relative direct inputs (Johnson, 1972, p. 469; cf. Chandler, 1977, p. 71), although they did not record depreciation or allocate unexpired costs to inventory. It seems therefore that those earlier mill accountants in the U.K. and U.S.A. had mastered the technical book-keeping procedures for allocating costs, but had not yet tackled the problem of choosing the appropriate *basis* for the allocation of overhead in order to ascertain the "correct" unit cost: this debate was to occupy much of the second half of the 19th century (Solomons, 1968).

On the basis of this evidence we would argue that these factories, down to the 1850s, represent the last forms of the precursor systems and that, as we have argued (e.g. at pp. 7, 19 and 32 above) it is not until the disciplinary potential of cost accounting was discovered that it was widely taken up and developed. It was concern with measuring human performance that underlaid the arguments over how to find "true cost", as much as any quest for a rational basis for economic decisions (and the final expression of these concerns was the development of the "standard costing" systems of the late nineteenth and early twentieth centuries (cf. Miller & O'Leary, 1987)). Johnson argues (1972, p. 473–474) that the data which were obtained at the Lyman mills in the late 1850s were not used (nor useful) in making economic decisions (e.g. to evaluate production decisions, assess investment potential or choose output levels of various styles) but rather for internal control (e.g. "to assess the physical productivity of mill operatives; to assess the impact on operations of changes in plant layout; and to control the receipt and use of raw cotton").

Again, re-examination of the original records of the Charlton and "Waltham" mills from this different perspective is called for: but the published histories suggest that for the earlier period before 1850 our attention should focus primarily on the armories, which over this period present a rather different picture.

## APPENDIX B. HARPERS FERRY

While Springfield had a military Superintendent, Roswell Lee, Harpers Ferry had a civilian, James Stubblefield. Smith (1977, p. 110) points out that from 1815 Lee and Stubblefield "regularly exchanged information relating to annual inventories, accounting methods, wage rates and general shop procedure", yet the initiative almost invariably



came from Lee. Ultimately it became clear that Stubblefield was operating his own covert strategy of accommodation with the anti-disciplinary forces of pre-modern culture. His armorers ran their own shops "as long as they were willing to pay for the privilege", and he tacitly encouraged drinking "since he owned part interest in a distillery and had at least one in-law who owned a tavern" (p. 150). There were no work rules "or any other formal regulations aimed at enforcing discipline, time-thrift or other forms of austerity". Therefore, once the army finally caught up with Stubblefield, worker resistance erupted in a decidedly overt manner.

Lee was sent to take over temporarily (and reluctantly) in November, 1826 and instituted Springfield-style work-regulations (pp. 172-173), while Stubblefield was subjected to an official inquiry of complaint (which exonerated him). Stubblefield was reinstated in June, 1827 so that for the time being nothing changed. However a second inquiry in 1829 found him culpable and he soon resigned to be replaced by another civilian, Thomas Dunn. Dunn revived the Lee regulations and also issued detailed instructions to his inspectors, known as the "Yellow Book" (p. 255), while corresponding with Lee on further reforms including "the adoption of standardized bookkeeping methods". The result for Dunn was angry and violent resistance from the work-force, culminating in his murder by a dismissed former armorer named Ebenezer Cox on 29 January, 1830.

This ensured that subsequent Superintendents followed a path of discretion until the appointment of a military man, Major Henry Craig in 1841 (when Major James Ripley was also appointed to bring back the military regime at Springfield). Even then the Harpers Ferry work-force maintained their tradition of resistance, walking off the job in the so-called "clock strike" of 1842 (p. 272). The resistance was then met by a first invocation of a regulatory state apparatus. The Chief of Army Ordnance, George Talcott, directed a report to the Secretary of War pointing out that "the regulations governing the workmen are *not changed*, they are merely *enforced*, every man being required to commence work at a fixed hour and labor during working hours" (p. 274). Irregularity "was an abuse, formerly tolerated but never sanctioned by the regulations". He concluded: "this is the *real cause* of their objections to a Military Superintendent. He enforces the regulations which lay bare their secret practices (frauds — for I can use no better term)." On this basis the Secretary of War sponsored legislation to confirm permanent military superintendency of the armories which was passed in August 1842.

Stubblefield's evasion of accountability can hardly be put down to lack of encouragement and direction from the top. In 1815 Wadsworth and Bomford called a conference with Lee, Stubblefield and Eli Whitney to promote the adoption of interchangeable-part manufacture with all that it implied (Smith, 1977, pp. 106-107). The two of them came to this, in Smith's words, "as zealous advocates of the "uniformity system" and relentlessly pursued the idea of introducing it at the national armories". As Smith tells it (p. 106, pp. 141-143) "to Bomford . . . fell the responsibility of promoting greater

systematization and efficiency at the national armories". His scheme for Harpers Ferry set out new regulations scheduled for January 1816 which "revised, even reversed, the old administrative power structure . . . they clearly outlined the duties, accounting procedures and spheres of authority for each officer . . . (and) enlarged the superintendent's power as director of all operations at the armory". Yet as we have seen, Stubblefield circumvented these directives where it suited him.

Bomford certainly was not deceived. When he succeeded Wadsworth "he constantly badgered the superintendent about the nonpayment of debts, shoddy bookkeeping methods and questionable employment practices at the armory" (Smith, 1977, p. 153, citing the Bomford-Stubblefield correspondence, 1821-1829). But it was not till 1829 that he got rid of Stubblefield and replaced him with the more congenial Thomas Dunn (however unfortunate the appointment proved for Dunn himself). Even then, political realities under Jackson and van Buren meant that he had to acquiesce in a continued system of civilian superintendents. It was only when the Whigs under Harrison won the election of 1840 that he was able to secure approval of a military superintendency, selecting Majors Henry Craig and James Ripley for Harpers Ferry and Springfield respectively. Therefore Bomford clearly had a major role as a directive intelligence promoting discipline and accountability, but his efforts proved to be constantly compromised.

## APPENDIX C. OTHER DEVELOPMENTS ON THE RAILROADS

### *McCallum and the Erie*

In McCallum's Report of 1855, he stressed the importance of adhering to explicit lines of authority and communication: "All subordinates should be accountable to and directed by *their immediate superiors only*", he wrote, and to this end there was express delegation of authority to regional superintendents in charge of geographical divisions for day-to-day running of trains in all aspects "except in matters pertaining to the duties of General Ticket Agent, General Freight Agent, General Wood Agent, Telegraph Management, and Engine and Car Repairs" (Chandler, 1977, p. 102), matters which remained under the direct control of the General Superintendent. McCallum drew up an organization chart, "one of the earliest . . . in an American business enterprise", (p. 103) to illustrate the lines of authority precisely. However Chandler notes that he "failed to define precisely the relationship between the geographical division superintendent and the other functional managers of the division who reported to the general superintendent" so that it seems to us that he only developed, not fundamentally changed, the structural solutions previously adopted on the Western and the Baltimore & Ohio.

McCallum also stipulated the forms that communication should take: "hourly reports . . . sent by telegraph, gave the lo-

cation of trains and reasons for any delays or mishaps... Daily reports, the real basis of the system, were required from conductors, agents and engineers. These were then consolidated into monthly statements" (ibid.). Primarily he used tabular forms whose information could then be used as an archive for analysis and improvement. Concerning the material it could eliminate "causes of delay", inefficiency and poor economy. Concerning men it gave the principal officers "all information necessary to enable them to judge correctly as to the industry and efficiency of subordinates of every grade". Finally, by creating for each of the five operating divisions its own "separate and detailed set of accounts", McCallum had the wherewithal for "understanding and controlling costs and... setting rates" (p. 104).

Chandler (1956, p. 321, n. 56) notes that McCallum's reporting system, like the organizational plan and the use of the telegraph, had been initiated in part on the Erie before he became general superintendent, but that "he systematized the initial plans and unified them so that they became all integral parts of one comprehensive operating scheme". An interestingly "militaristic" characteristic of his reforms was the requirement that all employees wear uniforms with insignia indicating their grade (1956, p. 48). The Erie was also one of the railroads to experience the most overt resistance from employees to the new discipline: some of the first strikes by skilled railroad operators (from 1856 onwards) were against administrative and operational regulations and these were most serious on the Erie (1956, p. 155; the Baltimore & Ohio also had somewhat similar strikes).

McCallum's organizational changes were extensively publicized in Henry Varnum Poor's influential *American Railroad Journal*. Poor was closer to McCallum than to any of the other railroad chiefs (1956, p. 147). The line was New York based, like the journal, and Poor had been extremely critical of McCallum's predecessors on the Erie and watched his reforms with interest and approval. However, by 1857 (when McCallum left the line) Chandler concludes that Poor had already begun to doubt whether these improvements in systematic organization, communication and information, howsoever necessary for large-scale management to succeed, were sufficient to cope with the complexity of its financial and operating problems (1956, p. 153).

#### *Later accounting developments*

The railroad innovations were publicized and discussed in

the railroad trade journals and financial periodicals (but not yet in manufacturing and marketing). Thus "by 1860 the railroads probably employed more accountants and auditors than the federal or any state government" (Chandler, 1977, p. 110) and were constantly engaged in improving and refining the analyses which their multiform accounts could offer. They devised systems for financial, capital and cost accounting: they "began... to use the "operating ratio" as a standard way to judge a road's financial results" (ibid.); the huge investments in capital, plant and stock made a division between capital and operating costs imperative and led to new analyses of the problem of depreciation; finally, McCallum's concern with comparative cost data was developed after the Civil War into a full cost accounting system, largely through the efforts of Albert Fink, who had worked on the Baltimore & Ohio before going to the Louisville & Nashville, becoming its general superintendent in 1865.

McCallum had said of costing in 1855 (in clear examinatorial tones) that "it will show the officers who conduct their business with the greatest economy, and will indicate, in a manner not to be mistaken, the relative ability and fitness of each for the position he occupies... and, it is believed, will have the effect of exciting an honorable spirit of emulation to excel" (pp. 115-116). Fink later gave this aspiration flesh by recategorizing his whole network of accounts "according to the nature of their costs rather than according to... departments" and so constructing a new kind of measure of unit cost, the ton mile, by means of a complex formula applied to the four categories of account which he had discriminated.

These were (1) accounts whose costs varied little with volume of traffic (2) those which varied with volume of freight but not distance covered (3) those containing "movement expenses" which varied with the number of trains and their fullness and (4) those containing interest charges. This enabled him to distinguish the relative costs of heavily and lightly travelled divisions and to set variable rates according to such costs (as well as such other relevant factors as demand and competition). But most of all it enabled, via the development of time series of costs and constant reviewing procedures, the identification of those officers who did conduct their business with economy, relative ability and fitness.

Thus Chandler concludes (p. 117) that "cost per ton-mile... became the criterion by which the railroad managers controlled and judged the work of their subordinates... (and) cost accounting... came to be used as an operational rather than a financial control".

## THE INTERACTION BETWEEN NATIONAL AND ORGANIZATIONAL CULTURES IN ACCOUNTING FIRMS\*

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### Abstract

This paper reports the results of an empirical study of the interaction between national and organizational cultures at the firm level. Using Hofstede's Value Survey Module, the concept of culture was operationalized in six accounting firms in The Netherlands. Three of these firms were local offices of international "Big Eight" accounting firms with a strong U.S.-orientation in their organizational philosophies and policies, whereas the other three firms were Dutch in origin and organization. All six firms work virtually entirely with Dutch employees. We were specifically interested in any influences of the U.S. culture upon the Big Eight firms. For two of Hofstede's four cultural dimensions, i.e. Uncertainty Avoidance and Masculinity, significant effects of the U.S. culture upon the organizational cultures of the Big Eight firms were found. Further analysis showed that these results may rather be due to (self-)selection than to socialization mechanisms.

One way to look at the problem of organization is to view it as a manifestation of the general problem of social order (e.g. Smircich, 1983). From that perspective, culture is an indispensable element of organizational analysis, since it is the pivotal concept in the study of social order. Through culture, individuals are integrated into social units, such as families, clubs and associations, firms, regions, or nations. They internalize the values and norms of these social units in their personalities and thus, generally, tend to exhibit more stable and predictable behavior. In this way they render possible the existence of a social order and, consequently, of organizations.

There are nearly as many definitions of culture as there are authors writing about this subject (e.g. Ansari & Bell, 1985; Frost *et al.*, 1985). For the purposes of this study culture refers to "a collective programming of the mind which distinguishes one group from another" (Hofstede, 1980, p. 25). Cultures can be observed through myths, rituals, habits, beliefs and taken-for-

granted assumptions about reality. But especially important are the values espoused by the individuals of a group (Goode, 1984; Schein, 1985).

The concept of culture can be studied at different levels of analysis. In the organizational literature two levels have attracted most attention:

(1) the influence of *national cultures* upon organizations (Hofstede, 1980, 1983; Lammers & Hickson, 1979, p. 403)

(2) the concept of *organizational culture* itself (Pettigrew, 1979; Smircich, 1983; Frost *et al.*, 1985; Schein, 1985).

However, the *interaction* between national and organizational cultures has not yet received very much attention. Such interaction may occur in mergers across national boundaries or in the creation of foreign subsidiaries by multinational companies. In these cases one may observe the development of cultures which are hybrids between the international organizational culture and the local national cultures

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istede, 1985; Negandhi, 1987).

Like many other industries, the accounting profession shows a trend toward increasing internationalization. This trend is manifested in international mergers of accounting firms and in the establishment of international associations of local accounting firms. The most recent example is the merger between KMG and PMM into KPMG. In such cases the compatibility of the organizational cultures is a major area of concern, particularly with regard to human resource management. It is highly likely that organizational cultures vary with national cultures. It is, therefore, surprising that very little is known about the interaction between national and organizational cultures.

One of the few studies addressing this issue examined Japanese firms in the United States (Lincoln *et al.*, 1978). It was found that the number of Japanese or Japanese-American employees varied inversely with the degree to which narrowly defined occupational roles (functional specialization) were found within these firms. However, no significant effects could be demonstrated with respect to centralization, formalization or vertical differentiation (Lincoln *et al.*, 1978, p. 845). This supports the idea that Japanese management styles, if embedded in a Western environment, may converge with those of the West. Note, however, that all these measures concern the *formal* structure, the official design, of the organization. It may well be that "the actual interaction structures, which develop in the course of day-to-day activities", do show effects of the national culture of the mother organization (Lincoln *et al.*, 1978: 845; see also Meyer & Rowan, 1977). Lincoln *et al.* (1978) refer to such actual interaction struc-

tures in terms of organizational culture. Following such an interpretation, the influence of the national culture of the mother organization on subsidiaries overseas may be particularly noticeable in their organizational cultures, and not in their formal structures. However, until now, there is no evidence to support this hypothesis. This finding provides the point of departure for the present research.

## RESEARCH PROBLEM

This study forms part of a larger research project which was directed towards the examination of cross-national differences between accounting firms.<sup>1</sup> As such, the original design of this research allowed the investigation of national cultural effects upon similar firms. In this paper we address a different research problem. Broadly defined our research problem is: what are the cultural differences between local<sup>2</sup> and international (U.S.-oriented "Big Eight"<sup>3</sup>) accounting firms, operating in the same national (Dutch) culture?

In brief, a comparative examination of local and international accounting firms offers an opportunity to assess to what extent national and organizational cultures interact, as reflected by the work-related values of their Dutch employees. Thus, the research problem may be defined in terms of two questions:

(1) Is it possible to detect the influence of the U.S. culture upon the Big Eight international firms to explain any differences between measurements of work-related values for employees in these firms and in the Dutch firms?

(2) If so, is it possible to identify which cul-

<sup>1</sup> This larger project is coordinated at the University of Washington, Seattle, U.S.A. by Jamie Pratt. This international project will yield results about the cross-national differences in cultures of accounting firms. In our study we have focussed on national and organizational cultures of accounting firms *within* a particular country.

<sup>2</sup> Our local Dutch firms have relatively recently become part of international associations of accounting firms. This has, however, not (yet) had a significant impact on their local philosophies and policies.

<sup>3</sup> While most of the Big Eight firms have historical roots in the U.K., they have been rather strongly Americanized over time. The firms in our sample have their headquarters and general management in the U.S. Moreover, their organizational and personnel policies have a strong U.S. orientation, as confirmed by the local partners in these Big Eight firms in pilot and exit interviews with us.

tural influence is dominant, the national or the organizational?

As compared with the Dutch firms, the Big Eight accounting firms have only recently entered the Dutch market. By consequence, they are much smaller in both personnel and average fee income (International Accounting Bulletin, 1985). On average there are roughly 1000 professional staff members in the three Dutch firms and some 100 in the three international firms. However, the growth rates of the fee income are much more impressive for the Big Eight firms. Whereas the Dutch firms show yearly growth rates of fee income varying from 0 to 10%, the corresponding figures for the Big Eight firms range from 15 to 25% (IAB, 1985).

In preliminary interviews with key informants of the six firms which provided the focus for the study, organizational policies were observed to differ quite markedly between the types of firms. The international firms have adopted a number of policies elaborated at the group level and are, as such, heavily influenced by U.S. practice. A particular case in point are the personnel policies with respect to career development. The Big Eight firms tend to operate an "up or out" policy, whereas in the Dutch firms many more employees are traditionally maintained in sub-partner level ranks without prospects of further promotion and without any "pressure" to leave the organization. All six firms work virtually entirely with Dutch employees.

#### RESEARCH DESIGN AND METHOD

To operationalize the concept of culture for the sample of six accounting firms, we used Hofstede's (1980) method and instrument. Strictly speaking, Hofstede's approach was developed to quantify the effects of national cultures upon organizations. There are several reasons, however, why this method also appears to be appropriate for this research.

Hofstede collected measurements in 40 coun-

tries, but the measurements pertained to 40 different offices of only one multinational company. One must conclude, therefore, that his results reflect both national and organizational characteristics. While he presents his results as indicators of differences in national cultures, they also incorporate features of organizational culture. Moreover, his instrument was developed at the organizational level, and that is where we wish to apply it. In addition, the method has been replicated and validated in subsequent research (Bosland, 1984). Finally, the use of this method provides comparative data for both The Netherlands and the U.S.

Three Dutch and three international Big Eight firms were requested to participate in this study; all agreed to participate. A mail-back questionnaire was sent to the home addresses of all the employees of these firms who:

(a) were active in the accounting and auditing practice (thus excluding the tax and consulting practice as well as administrative and other supporting staff);

(b) had been evaluated on their performance at least once; and,

(c) had not yet reached the partner level.

These criteria produced a population of 986 potential respondents of whom 818 (83%) were employed by the Dutch firms. The response rate exceeded 65% (643 respondents) with firm response rates ranging from 60% to 81%.<sup>4</sup>

The distribution of respondents illustrates that our research design could not preclude the potential occurrence of confounding effects. In The Netherlands the international Big Eight firms are smaller and have been established more recently than their comparable Dutch counterparts. Of course, we could have approached smaller and younger Dutch firms, but then we would have potentially introduced other confounding effects, since those firms work primarily on a regional basis, have very different client portfolios than the Big Eight firms, and thus operate in different task environments. Subsequent research should try to separate the

<sup>4</sup> Both the highest and the lowest response rate were obtained for an international firm. The three firms which included their own introductory letter to our questionnaire attained the highest response rates.

ffects of age, size and origin.

#### *Measures and procedures of data analysis*

Hofstede's method involves the measurement of values and perceptions of individual members of the organization. These individual measurements are then aggregated to form organizational scores. For each organization a score on each of four cultural dimensions was obtained:

- (1) the degree of (perceived) *power distance*;
- (2) the degree of *uncertainty avoidance*;
- (3) the degree of *individualism*; and
- (4) the degree of *masculinity*.

The degree of *power distance* may be interpreted as the subjective counterpart of the well-known centralization/decentralization dimension. The dimension is measured on the basis of responses to three items: (1) the percentage of non-supervising respondents indicating (with examples) that they have an authoritarian or paternalistic superior; (2) the opinion of the same respondents about desirable styles of supervision; and, (3) the number of instances in which subordinates do not dare to express their disagreement with superiors.

The degree of *uncertainty avoidance* represents an indicator of the formalization or rule-orientation in the organization and is again measured on the basis of responses to three questions. The first asks for (dis)agreement with the statement that "an organization's rule should not be broken, even when the employee thinks it is in the organization's best interest". The second ascertains the number of employees who do not expect to work another five years for this organization. The third measures the (perceived) stress at work. In organizations where stress is perceived, it is hypothesized that members would tend to avoid uncertainty-generating situations.

The *individualism index* is based on responses to four questions which deal with physical working conditions, personal relations, the sufficiency of leisure time, and the quality of the living environment. If importance is attached to good physical working conditions and good personal relations, a collective orientation is indicated. If, on the other hand, importance is at-

tached to leisure time and a pleasant living environment, this is taken to reflect an individual orientation.

The *masculinity index* reflects the Western achievement-orientation. Respondents who value income and promotion opportunities higher than job security and good personal relations score highly on this index. Computational formulas for the four dimensions are presented in Appendix 1.

A few technical remarks are necessary concerning the analysis of the data. When making comparisons of organizations on one characteristic, such as organizational culture, it is necessary to control for other properties (Galtung, 1967). In our study, this implies that the basic characteristics of the respondents in the two categories of offices have to be the same. Examining these basic characteristics, it was found that the employees of the Big Eight offices were on average somewhat younger ( $F = 21.2$ ;  $p < 0.001$ ). Furthermore, they had fewer years of formal education ( $F = 12.4$ ;  $p < 0.001$ ) and occupied lower positions than their counterparts in the Dutch firms ( $F = 30.0$ ;  $p < 0.001$ ). As might be expected, position and years of formal education were significantly correlated ( $R = 0.25$ ;  $p \leq 0.001$ ). This implies that the standardization of culture scores can be restricted to the characteristics position and age. As the standard model we have chosen the position/age distribution of the three Dutch offices. In this standardization we have excluded from the computations those position/age combinations based on less than four respondents. This was done in order to reduce the influence of individual fluctuations. The standardized culture scores are weighted averages.

Finally, it should be noted that our results refer to the concept of culture at the organizational level. Hence, we have only six observations. Fisher's Exact Probability Test is an appropriate means for significance testing in this case (Siegel, 1956). The results of this test are presented in Appendix 2. In addition, one way analyses of variance have been performed on the 13 items comprising the four cultural dimensions. The results are also presented in Appendix

2. Although, strictly speaking, such an item-by-item analysis does not directly refer to organizational culture, the results do give a more detailed view of the underlying structure of our data.

### RESULTS

The results for the six offices with respect to

Hofstede's four culture dimensions, are presented in Tables 2 and 3. Table 1, on the other hand, presents comparative results for the national cultures of the U.S. and The Netherlands, as observed by Hofstede (1980).

TABLE 1. The four culture dimensions in the locations in The Netherlands and the United States (Hofstede, 1980)<sup>a</sup>

|                           | U.S.A. | The Netherlands | (U.S.-Neth.)<br>Range)* 100 | Range |
|---------------------------|--------|-----------------|-----------------------------|-------|
| 1. Power distance*        | 40     | 38              | 2                           | 11-94 |
| 2. Uncertainty avoidance* | 46     | 53              | -7                          | 8-112 |
| 3. Individualism*         | 91     | 80              | 11                          | 12-91 |
| 4. Masculinity*           | 62     | 14              | 48                          | 5-95  |

\*A high value indicates a high score on the dimension measured.

TABLE 2. The four culture dimensions in the six offices; standardized weighted averages\*

|                          | Netherlands<br>1<br>(1) | Netherlands<br>2<br>(2) | Netherlands<br>3<br>(3) | Netherlands<br>total<br>(4) | Big Eight<br>1<br>(5) | Big Eight<br>2<br>(6) | Big Eight<br>3<br>(7) | Big Eight<br>total<br>(8) |
|--------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|---------------------------|
| 1. Power distance        | 45 (59)                 | 45 (211)                | 43 (42)                 | 45 (312)                    | 25 (18)               | 35 (42)               | 50 (28)               | 38 (88)                   |
| 2. Uncertainty avoidance | 5 (170)                 | 20 (253)                | -13 (95)                | 9 (518)                     | -33 (23)              | -43 (47)              | -34 (36)              | -38 (106)                 |
| 3. Individualism         | 62 (170)                | 44 (253)                | 64 (95)                 | 53 (518)                    | 62 (23)               | 71 (47)               | 53 (36)               | 63 (106)                  |
| 4. Masculinity           | 16 (170)                | 10 (253)                | 38 (95)                 | 17 (518)                    | 45 (23)               | 58 (47)               | 81 (36)               | 63 (106)                  |

\*A higher value in the table indicates a higher degree of the dimension measured. Between parentheses we have added the number of respondents in each cell. For tests of significance see Appendix 2.

TABLE 3. Partial correlations between length of employment and the most discriminating items of the four cultural dimensions (controlled for age)

|                                                                                                             | The Netherlands<br>(N = 523) | Big Eight<br>(N = 116) |
|-------------------------------------------------------------------------------------------------------------|------------------------------|------------------------|
| 1. Subordinates are afraid to express disagreement with their superiors<br>(low = very frequently)          | 0.12*                        | -0.08                  |
| 2. Duration of period one thinks one is likely to continue working for this company<br>(low = short period) | 0.24†                        | -0.02                  |
| 3. Importance attached to good physical working conditions<br>(low = little importance)                     | -0.04                        | -0.14                  |
| 4. Importance attached to having an opportunity for high earnings<br>(low = little importance)              | 0.01                         | -0.06                  |

\*0.001 < p ≤ 0.01 †0.000 < p ≤ 0.001

<sup>a</sup> Two of the four culture-dimensions (i.e. Individualism and Masculinity) do not fully identify with Hofstede's original instruments. This is due to some changes, proposed by himself. As a consequence, for these two dimensions, both studies are only comparable in terms of central tendencies.



the differences between the two nations are not very pronounced with respect to power distance (relatively modest in both countries, slightly larger in the U.S.). The culture dimension of uncertainty avoidance is relatively weak in both countries, but slightly stronger in The Netherlands.

Further, one can see a somewhat higher degree of individualism and a very high degree of masculinity in the North American culture. On the latter dimension, the strong achievement-motivation of (parts of) the North American society is apparent. This characteristic of the United States has been previously documented (e.g. R. & H. Lynd, 1937). From Hofstede's (1980) study it could be hypothesized that, if any differences exist between the Big Eight offices and the Dutch firms, they would be especially pronounced on the dimension of masculinity. Table 2 presents data on this hypothesis.

With regard to power distance, the Dutch offices do not differ among themselves; the Big Eight offices, however, do. Both the office with the smallest and the office with the largest power distance is a Big Eight office. As a whole, the Big Eight offices show a somewhat smaller power distance than the Dutch offices. This difference, however, is not significant. This deviates from Hofstede's findings which showed a slightly larger degree of power distance in the United States. Given the divergent scores for the Big Eight firms, it appears that the national North American culture had no influence on the Big Eight offices in The Netherlands regarding this cultural dimension. The varying results may be best explained by other dimensions or by differences in organizational cultures.

National cultural influences, however, are apparent with respect to the dimension of uncertainty avoidance. All three Big Eight offices have significantly lower scores in this regard than their Dutch counterparts (see also Appendix 2). Furthermore, the standard deviations are uniformly small. This finding is consistent with Hofstede's results and implies that the employees in the Dutch firms offices are more concerned about avoiding uncertainty-generating situations than their colleagues in the Big

Eight offices. In particular, the employees in the Dutch firms are far less inclined to seek another job in the short term.

In one respect, however, there is an important deviation from Hofstede's (1980) findings. Five of the scores for uncertainty avoidance that were obtained in this study are much lower than even the lowest scoring country in the Hofstede study. In fact, four negative scores were observed which do not occur in Hofstede's study at all (although they are possible by definition). The most likely explanation for this deviation is thought to be as follows. In the uncertainty avoidance index the intention of the employee to seek another job plays an important discriminating role, and since Hofstede's results pertain to locations of one multinational enterprise, which is characterized by a system of long-term (or even lifetime) employment, this item plays a much less prominent role in his study than in ours. The promise of lifetime employment is not given by accounting firms and certainly not by the Big Eight firms with their philosophy of "up or out". This means that labor mobility in accounting firms in general, and especially in the Big Eight firms, is an important element both of these organizations' personnel policies and of the individual's career planning. To the extent that the "up or out"-philosophy is more prominent in the Big Eight firms than in the Dutch offices, this circumstance can also explain the difference in uncertainty avoidance between these two categories of firms.

With respect to the cultural dimension of uncertainty avoidance, we have thus found a certain influence of the North American national culture on the Big Eight firms in The Netherlands. Secondly, we have demonstrated an industry-specific cultural influence. Our accounting firms as a group appear to be different from Hofstede's multinational company in this respect.

With respect to the index of individualism we find no significant difference between the Dutch and the Big Eight firms (see Appendix 2A). Table 2 shows that the aggregate score for the Big Eight firms signifies a somewhat more individualistic culture, which corresponds to

Hofstede's findings. Further analysis reveals that this is due to the relative weight assigned to a particular item of the index. This item (the importance attached to good working conditions, see Appendix 1) points toward the Big Eight firms having a more individualistic culture, although the difference with the Dutch firms is not significant (see Appendix 2B). The other three items show mixed results. As a whole, therefore, no conclusive findings emerge from our data on this dimension.

The Hofstede (1980) findings are completely confirmed with respect to the last cultural dimension, the index of masculinity. In the Big Eight offices it is possible to distinguish a strong national cultural influence from the U.S., particularly with respect to a strong orientation towards high income and good career perspectives. Tenure and good relations with colleagues are considered less important. This huge difference in achievement-orientation is probably the most salient and significant distinction between the cultures of The Netherlands and the United States.

#### *(Self-) Selection versus socialization*

From our results it appears that there are significant effects of the U.S. culture upon the organizational cultures of the Big Eight firms operating in The Netherlands. These are surprising if one takes into account that these firms employ very few U.S. citizens. In our sample only four of the respondents in these firms were not Dutch by birth. Thus, the Big Eight firms do not differ significantly from the Dutch firms in the composition of their work force. At the same time, the values and norms of the Dutch employees in these Big Eight firms form the building-blocks of an organizational culture which is strongly U.S.-oriented in several respects.

Two hypotheses can be postulated to explain this phenomenon (see also Schneider & Reichers, 1983). The first is the (self-) selection hypothesis which would indicate that employment in a Big-Eight firm is attractive to those Dutch accountants who already conform to certain aspects of the U.S. culture. Alternatively,

such a selection process could be carried out by the Big Eight firms themselves. Of course, the two mechanisms of self-selection and selection by the firm may be mutually reinforcing. The second is the socialization hypothesis which would indicate that employees internalize aspects of the U.S. culture through organizational processes of socialization. Salaman (1979), as well as Peters & Waterman (1982), has identified such processes. New employees follow certain rites of passage. To a certain extent they may be indoctrinated as to what is considered to be important in the organization, what standards of conduct are upheld, what kind of humor is acceptable, and so on. Possibly such processes are more pronounced in multinational organizations since a certain degree of bi-cultural integration has to be achieved.

The validity of these hypotheses was investigated in two different ways. First, we examined whether the employees of the Big Eight firms explicitly demonstrated an earlier interest in the U.S. culture before entering the firm. However, our evidence shows that these employees do not differ from their colleagues in the Dutch firms in the following respects:

- (a) they received their primary, secondary as well as tertiary education in The Netherlands;
- (b) they obtained their accounting degree in The Netherlands; and,
- (c) their work experience was primarily in The Netherlands.

Hence, we can find no explicit indications in our data of an earlier interest in the U.S. culture. However, it is possible that the Big Eight firms receive applications and select from a sample of Dutch citizens whose work values resemble those of the U.S. labor supply.

To further test for the possibility of (self-) selection vs socialization, we computed partial correlations between the length of employment at the firm and four items from the questionnaire; the four items were selected because they were found to discriminate best (for each dimension of culture) between the Dutch firms and the Big Eight firms. If the socialization hypothesis is valid one would expect the typical features of U.S. culture to become more prominent

over the years. However, if the (self-)selection hypothesis is valid, one would expect the employees to already exhibit their U.S. orientation upon entry to the firm (leading to low correlations over time).

Of the eight correlations presented in Table 3, two are significant. These correlations point towards mechanisms operative in the Dutch firms. Their employees expect to stay longer with the firm as their employment time increases. This simply points towards the existence of older employees at the sub-partner level in these firms. That these employees dare to contradict their superior more often over time is understandable. It is, however, not an aspect prominent in the Dutch culture, but one found more commonly in the U.S. culture. In fact, the absence of any correlation significantly different from zero for the international firms, lends support to the (self-)selection hypothesis. All in all, we can hardly find any indications that the cultural differences between the Dutch and the Big Eight firms are to be explained by socialization processes, which figure so prominently in the literature on organizational cultures (e.g. Peters & Waterman, 1982). The differences in work-related values of the employees of these firms do not increase over time, but appear to exist from the onset.<sup>6</sup>

If anything, our data can be interpreted as pointing towards the (self-)selection hypothesis.<sup>7</sup> This result conforms to some earlier findings in the literature. Lammers (1963), for instance, studied the recruitment of Dutch Navy officers and found that self-selection is the most important mechanism in this regard. Socialization after entry into the Navy only provided the "finishing touch" (see also Hines, 1973). Waller & Chow (1985) also detected the importance of

the self-selection mechanism. They found that workers select among alternative employment contracts based on their performance capability. Thus, it may be concluded that self-selection of the workers of the Big Eight firms, in combination with the selection policies of these firms themselves, is probably the best explanation for the U.S.-oriented culture in these organizations.

## SUMMARY AND DISCUSSION

Using Hofstede's Value Survey Module we have empirically studied the cultures of six accounting firms in The Netherlands. We found rather pronounced effects of the U.S. national culture upon the organizational cultures of the Big Eight firms in our study. On the dimensions of Uncertainty Avoidance and Masculinity there were significant differences from the three Dutch firms. On the dimensions of Individualism, mixed results were obtained, whereas no significant differences were established with respect to Power Distance. In addition, an industry-specific component of organizational culture was demonstrated with respect to the dimension of Uncertainty Avoidance. As a group, our six accounting firms differed from Hofstede's (1980) multinational firm on this dimension.

Our second research question was whether national or organizational culture is dominant. We found no general answer to this question. For the Power Distance and Individualism dimensions no systematic differences emerged. For the Uncertainty Avoidance and Masculinity dimensions the differences were significant and systematic. Thus, a clear influence of the external (U.S.-)culture could be detected. For these

<sup>6</sup> The texts of the advertisements for new personnel of the two types of organizations underline this (self-)selection mechanism. The Big Eight firms want to have employees, who "hardly have time for a girlfriend, but know everything about foreign daughters". The new employees of these firms will "probably lack leisure time, but will certainly have enough career opportunities" (text from an advertisement for the recruitment of new employees, April 1985). Dutch firms advertise with more sober slogans.

<sup>7</sup> One caveat must be mentioned here. In our variable "length of employment" the lowest value is "six months to one year". Thus, on the basis of our analysis it cannot be excluded, that socialization effects occur within the *first* (half) year of employment (Ouchi, 1982).

latter dimensions our results are in line with the hypotheses derived from Hofstede's (1980) earlier work.

A further analysis of our data revealed that these results were probably best explained by a mechanism of self-selection by the employees and/or selection by the firms. We found little support for the hypothesis that a socialization process is operative in which the Dutch employees gradually internalize U.S.-oriented work values.

In interpreting our results one caveat should be repeated. Given the composition of international Big Eight firms and their local counterparts in The Netherlands, our research design could not preclude potentially confounding effects of age and size. The Big Eight firms are younger and smaller than the comparable Dutch firms. Future research in other countries should try to control for such factors. In addition, it would be interesting to explore the relationships between organizational culture on the one hand and strategy, structure and performance on the other (cf. Lincoln *et al.*, 1978; Pennings & Gresov, 1986).

For the accounting firms in our study our re-

sults may have several potential implications. The Dutch firms may, for instance, want to evaluate their recruitment and training policies in the light of the increasing internationalization of the accounting profession (see also Negandhi, 1987). Given the substantial differences which already exist on several dimensions with the Big Eight firms in The Netherlands, it may be expected that similar or greater differences exist with some of the foreign partners in the international associations of which these Dutch firms have become a member. For the Big Eight firms our results provide insights into the type of Dutch employees they attract. Our findings suggest that the work values of these employees are already mainly oriented toward U.S. culture upon entry. Thus, the recruitment policies of these firms may be more important than their training (or socialization) policies in this respect. Finally, our results may be indicative of the points at which tensions may arise if attempts are made to set up joint ventures between Dutch and Big Eight firms, or to merge such firms. Further work in this area may provide empirical content to the observed phenomenon of "culture clashes" on such occasions (Walter, 1985).

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## APPENDIX 1

The four cultural dimensions are computed on the basis of the following formulas:

*Power distance index*\* = 135 – 25 (mean score "employees are afraid to disagree") + (% perceiving the superior to take decisions in an autocratic or persuasive/paternalistic way) – (% preferring the superior to act in a consultative style).

*Uncertainty avoidance index*\* = 300 – 30 (mean score "rule orientation") – (% intending to stay less than 5 years) – 40 (mean stress score).

*Individualism index*† = 76 (mean score "importance good physical working conditions") – 43 (mean score "importance of having sufficient time left for personal or family life") + 30 (mean score "importance to work with people, who cooperate well with another") – 27 (mean score "importance living in an desirable area") – 29.

*Masculinity index*† = 60 (mean score "importance of working with people, who cooperate well with another") – 66 (mean score "importance of having an opportunity for high earnings") + 30 (mean score "importance of having security of employment") – 39 (mean score "importance of having an opportunity for advancement to higher level jobs") + 76.

\*Hofstede (1980).

†Hofstede (1982). The weights of these items are based on the factor loadings of the original study.

## APPENDIX 2. SIGNIFICANCE TESTS

(A.) A first test has been computed using the mean cultural scores of the six accounting firms. Since there are very few observations ( $N=6$ ), only Fisher's Exact Probability Test is appropriate (see Siegel, 1956, pp. 96–104). For each cultural dimension the six scores have been dichotomized into high and low scores, using the median as the cut-off point. In this way Table 2 could be reorganized in four  $2 \times 2$  contingency tables, as follows:

| Type of company | Cultural dimension |   |     |   |     |   |     |   |
|-----------------|--------------------|---|-----|---|-----|---|-----|---|
|                 | PDI                |   | UAI |   | IND |   | MAS |   |
|                 | H                  | L | H   | L | H   | L | H   | L |
| Dutch           | 2                  | 1 | 3   | 0 | 2   | 1 | 0   | 3 |
| International   | 1                  | 2 | 0   | 3 | 1   | 2 | 3   | 0 |

Using Fisher's test, respectively the  $p$ -values for PDI and IND are 0.45 and 0.05 for UAI and MAS. Using the table of critical values in the Fisher Test (Siegel, pp. 256–257) it can be concluded that the UAI and the MAS-index show significant differences between the Dutch and International firms at the 5% level.

(B.) A further test of significance included one way analyses of variance with regard to the 13 work related values (Dutch firms:  $N=526$ ; Big Eight firms:  $N=117$ ).

These are as follows:

|                                                               | Dutch firms | International firms | F-value | Significance |
|---------------------------------------------------------------|-------------|---------------------|---------|--------------|
| <b>Power distance</b>                                         |             |                     |         |              |
| Employees afraid to disagree<br>(low = very infrequently)     | 3.3         | 3.8                 | 31.4    | †            |
| Perceived superior<br>(low = paternalistic)                   | 2.6         | 2.3                 | 3.4     | N.S.         |
| Preferred superior<br>(low = paternalistic)                   | 2.8         | 2.7                 | 3.3     | N.S.         |
| <b>Uncertainty avoidance</b>                                  |             |                     |         |              |
| Rule orientation<br>(low = strong)                            | 3.8         | 4.0                 | 3.7     | *            |
| Intention to stay with the company<br>(low = short period)    | 2.7         | 1.8                 | 69.3    | †            |
| Perceived stress<br>(low = always)                            | 3.3         | 3.2                 | 0.5     | N.S.         |
| <b>Individualism</b>                                          |             |                     |         |              |
| Imp. good working conditions<br>(low = high importance)       | 2.0         | 2.2                 | 3.5     | N.S.         |
| Imp. time for family life<br>(low = high importance)          | 1.7         | 1.9                 | 7.7     | †            |
| Imp. of good cooperation<br>(low = high importance)           | 1.5         | 1.6                 | 2.2     | N.S.         |
| Imp. of living in a desirable area<br>(low = high importance) | 1.5         | 1.7                 | 8.4     | †            |
| <b>Masculinity</b>                                            |             |                     |         |              |
| Imp. of good cooperation<br>(low = high importance)           | 1.5         | 1.6                 | 2.2     | N.S.         |
| Imp. of high salary<br>(low = high importance)                | 2.3         | 1.9                 | 18.4    | †            |
| Imp. of job security<br>(low = high importance)               | 2.2         | 2.6                 | 14.5    | †            |
| Imp. of career prospects<br>(low = high importance)           | 1.8         | 1.5                 | 14.1    | †            |

\*  $0.01 < cp \leq 0.05$ . †  $0 < cp \leq 0.01$ .

## SLACK IN PARTICIPATIVE BUDGETING: THE JOINT EFFECT OF A TRUTH-INDUCING PAY SCHEME AND RISK PREFERENCES\*

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### Abstract

An incentive problem in participative budgeting occurs when a worker has private information about factors that influence his or her performance and the pay scheme is budget- or standard-based. This information, if communicated accurately by the worker, may be valuable to a manager for planning and control purposes. However, the worker has an incentive to bias its communication such that a relatively easy standard is set, thereby creating slack. To alleviate this problem, analytical research has proposed truth-inducing pay schemes that provide incentives for accurately communicating private information and maximizing performance. A conventional assumption underlying these schemes is worker risk neutrality, despite the widespread belief that risk aversion is more typical in organizational settings. This paper reports an experiment demonstrating that, when a (conventional) truth-inducing scheme is introduced, slack decreases for risk-neutral subjects but not for risk-averse subjects.

A widely recognized problem in management planning and control concerns upward communication by a worker with private information about factors that influence his or her performance. A worker's information often is superior to a manager's, such that communication of it would improve the manager's co-ordination and evaluation of organizational activities. However, when a worker believes that his or her private information, if communicated, would be used in setting a standard for performance evaluation purposes, there may be an incentive to bias the communication such that a relatively easy standard is set. Even if a manager is aware of this incentive, both planning and control may be impaired because of uncertainty about the extent to which information provided by a worker should be adjusted.

This problem is especially salient when a worker's pay scheme is budget-based and the budget-setting process is participative. Under some conditions, participative budgeting may have significant motivational and informational benefits to an organization (Vroom, 1964; Likert, 1967; Locke & Schweiger, 1979; Brownell, 1982). However, when a worker's pay increases as budget difficulty decreases, *ceteris paribus*, he or she may exploit the participative budgeting process to create slack, e.g. strive to set a budget below estimated future performance.<sup>1</sup> Without proper incentives for truthful communication, benefits of participative budgeting to an organization may be lost.

Truth-inducing, budget-based pay schemes have received considerable attention in analytical research (Ijiri *et al.*, 1968; Weitzman, 1976;

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<sup>1</sup> Slack may be defined as the excess of resources beyond those needed to complete a task (Cyert & March, 1963; Antle & Eppen, 1985). An operational definition of slack is the understatement of expected performance in the budget-setting process (Schiff & Lewin, 1970). In this study, slack is operationalized as the difference between the median of a worker's performance probability distribution and a participatively set budget (cf. Young, 1985).

Loeb & Magat, 1978; for a review see Jennergren, 1980). Such a scheme has two key features. First, assuming risk neutrality (among other things), it motivates a worker to reveal truthfully private information about future performance. Specifically, it induces a worker to prefer a budget equal to a particular fractile of his or her performance probability distribution, and in a participative budgeting context, this preference is likely to be expressed. Second, it motivates a worker to maximize performance *regardless* of the budget. The latter feature is important when performance depends on a random state variable. For example, if the budget were set equal to the median of the unconditional performance probability distribution and a favorable state were to occur, prior to effort exertion, then there normally should be an incentive to outperform the budget.

Despite the analytically demonstrated value of such schemes, they rarely are used by organizations in free market economies (Gonik, 1978) and little empirical evidence on their effectiveness is available.<sup>2</sup> Young (1985) reports evidence that, given state uncertainty and a worker-manager information asymmetry about performance capability, workers create slack even in the presence of a truth-inducing scheme and risk-averse workers create more slack than non-risk-averse workers do. Although Young's (1985) study is innovative, it has the following limitations. First, unlike the schemes examined in the analytical research, the one used in his study penalized outperforming the budget, which limits its general usefulness.<sup>3</sup> Second, there was no manipulation of incentives, so variation in slack due to incentives was not examined. Third, risk preferences were measured by the conventional lottery technique of which the validity and reliability are suspect

(Libby & Fishburn, 1977; Hershey *et al.*, 1982).<sup>4</sup> Chow *et al.* (1986) report evidence that, given a worker-manager information asymmetry about performance capability, slack is lower under a truth-inducing scheme than under a budget-based scheme with an incentive for creating slack. But, a limitation of that study is the assumption of state certainty and accordingly the failure to take risk preferences into account.

This paper reports an experiment in which subjects participatively set budgets under each of two pay schemes given state uncertainty. In one period, they set the budget under a scheme with an incentive for creating slack. In another period, they set the budget under a truth-inducing scheme like those examined in the analytical research (e.g. Weitzman, 1976). Risk preferences were *experimentally controlled* rather than *measured*, using the technique discussed by Berg *et al.* (1986). This technique allows the experimenter to induce (derived) utility functions with any shape, given the assumption that subjects maximize expected utility. Thus, it is possible to examine the effects of risk preferences on decision making under uncertainty without the usual measurement problems. In the experiment, risk neutrality was induced for one-half of the subjects and constant absolute risk aversion for the rest.

The results showed a joint effect due to pay schemes and risk preferences. Under the slack-inducing scheme, slack created by risk-neutral subjects was about the same as that created by risk-averse subjects. However, when the truth-inducing scheme was introduced, slack created by the risk-neutral subjects decreased significantly while that created by risk-averse subjects did not change. In short, the truth-inducing scheme was effective only under the condition

<sup>2</sup> Truth-inducing pay schemes have been used in centrally-planned economies (Berliner, 1975).

<sup>3</sup> The scheme would be useful in cases where a deviation from the budget in either direction is unfavorable for an organization. For example, outperforming a production budget for an intermediate product may create an excessive work-in-process inventory.

<sup>4</sup> A common variation of this technique is to ask a subject to specify the certainty equivalent of a lottery involving a probability  $p$  of winning a prize and a probability  $1 - p$  of receiving nothing. Subjects who specify a certainty equivalent less than the expected value of the lottery are classified as risk-averse.



of worker risk neutrality. Consistent with Young (1985), these results suggest that risk preferences are an important variable in explaining budgetary slack, especially in the presence of a truth-inducing scheme.

The remainder of the paper is organized as follows. The second section develops the study's hypotheses regarding pay schemes, risk preferences, and slack. The third and fourth sections describe the experiment's method and results, respectively. The last section provides some concluding remarks.

#### PAY SCHEMES, RISK PREFERENCES, AND SLACK

In many participative budgeting contexts, budget-based pay schemes should have incentives that induce a worker to communicate truthfully private information and maximize performance. Under various assumptions (see below), the following scheme has been shown analytically to have these features (Weitzman, 1976):

$$B = B' + b(y'' - y') + a(y - y''), \text{ if } y \geq y'' \quad (1) \\ = B' + b(y'' - y') + c(y - y''), \text{ if } y < y''$$

where  $B$  is the worker's actual bonus,  $y$  is actual performance,  $B'$  and  $y'$  are tentative bonus and budget levels, respectively, set by the manager,  $y''$  is the budget level as revised by the worker via participation, and  $a$ ,  $b$ , and  $c$ , are reward/penalty coefficients specified by the manager prior to participation such that  $0 < a < b < c$ . When  $B' = by'$ , the scheme reduces to the following form:

$$B = by'' + a(y - y''), \text{ if } y \geq y'' \\ = by'' + c(y - y''), \text{ if } y < y''. \quad (2)$$

The relationship among  $a$ ,  $b$ , and  $c$  is critical. Because  $a < b$ , the worker would not benefit from biasing  $y''$  downward and then overfulfilling the budget. Because  $b < c$ , the worker would not benefit from biasing  $y''$  upward and then underfulfilling the budget. Finally, because  $a > 0$ ,

the worker has an incentive for higher performance even when an unbiased budget has been attained, assuming that the marginal utility of pay exceeds the marginal disutility of effort.<sup>5</sup> Specifically, it is optimal for a risk-neutral worker to specify  $y''$  such that the following relationship holds (Weitzman, 1976):

$$P(y > y'') = \frac{c - b}{c - a} \quad (3)$$

Thus, the manager could obtain any desired fractile of the worker's performance distribution by manipulating the relationship among  $a$ ,  $b$ , and  $c$ .

To illustrate, suppose there is state uncertainty with three possible states,  $s_i$  ( $i = 1, 2, 3$ ), where  $P(s_1) = 0.15$ ,  $P(s_2) = 0.50$ , and  $P(s_3) = 0.35$ . A risk-neutral worker is sure that his performance will be sixteen units if  $s_1$  occurs, twelve units if  $s_2$  occurs, and eight units if  $s_3$  occurs. Suppose equation (2) is the worker's pay scheme, with  $a = \$4$ ,  $b = \$6$ , and  $c = \$8$ . Given a linear utility function,  $U(B) = B$ , the budget level which maximizes the worker's expected utility is twelve units, the median of his performance distribution ( $[\$8 - \$6]/[\$8 - \$4] = 0.50$ ). In contrast, if  $a = \$6$ ,  $b = \$4$ , and  $c = \$8$  ( $b < a < c$ ), the truth-inducing feature would be missing. The worker would have an incentive to specify  $y'' = 0$ , in effect converting the budget-based scheme into a piece-rate scheme which pays  $a$  per unit.

A key assumption underlying the above analysis is risk neutrality. When risk aversion is introduced, the scheme's incentives for truthful communication are not necessarily effective. If a manager knows only that a worker is not risk-seeking, then the manager can only conclude that the worker will set  $y''$  such that the following inequality holds (Weitzman, 1976):

$$P(y > y'') \geq \frac{c - b}{c - a} \quad (4)$$

<sup>5</sup> Regarding effort preferences, the general conclusion from the analytical research incorporating effort aversion is that the scheme retains the truth-inducing feature (Weitzman, 1976; Snowberger, 1977; Miller & Thornton, 1978; Bonin & Marcus, 1979).

This inequality includes the possibility of an expected utility-maximizing worker creating slack, i.e. specifying  $y''$  at a value below the fractile desired by the manager. Further, a tendency to create slack would increase with the degree of risk aversion. Suppose the worker in the above example has a utility function indicating constant absolute risk aversion,  $U(B) = -e^{-0.06B}$ , *ceteris paribus*. The optimal budget level for the worker is now only eight units. This result is consistent with statements in the literature that slack is created to avoid, or gain a buffer against, uncertainty (Cyert & March, 1963; Schiff & Lewin, 1970; Onsi, 1973). It also is consistent with Young's (1985) finding that risk-averse workers create more slack than non-risk-averse workers do.

The experiment reported below contributes further evidence on the association among budget-based pay schemes, risk preferences, and slack. Subjects were assigned to two groups: a risk-neutral group with the induced utility function,  $U(B) = B$ , and a risk-averse group with the induced utility function,  $U(B) = -e^{-0.06B}$ . Subjects participatively set their budgets for one period under a slack-inducing pay scheme (equation (1) with  $0 < b < a < c$ ) and for another period under a truth-inducing pay scheme (equation (1) with  $0 < a < b < c$ ). The following hypotheses were tested:

- H1. Both risk-neutral and risk-averse subjects create slack under the slack-inducing scheme.
- H2. When a truth-inducing scheme is introduced, the decrease in slack is greater for risk-neutral subjects than for risk-averse subjects.

## METHOD

### Overview

Subjects acted as workers who performed a production task for three periods. The task involved translating symbols into alphabetic characters using a decoding key.<sup>6</sup> A different pay

scheme was used each period. Prior to the first period, subjects performed a practice exercise, with performance feedback but without pay, to become familiar with the task. The first period served the dual purpose of acquainting the subjects with the experimental procedure and providing each subject with information on his or her task performance capability. However, no budget was involved, and the pay scheme was piece-rate. In the second period, the pay scheme was budget-based and slack-inducing, and the subjects participatively set the budget under state uncertainty. In the third period, the pay scheme was budget-based and truth inducing, and the subjects again participatively set the budget under state uncertainty.<sup>7</sup> A debriefing questionnaire included measures of effort preferences and manipulation checks. The measures of effort preferences were used for statistical control purposes in the test of H2.

Risk preferences (risk neutrality vs risk aversion) were manipulated on a between-subjects basis using a variation of the Berg *et al.* (1986) technique. Subjects were paid for their task performance each period initially in terms of points, but the number of points earned could turn into a cash payment in the following way. At the end of each period, they had a chance to win \$1.00 in a lottery. For a given subject, the probability of winning \$1.00 depended on the number of points earned and the experimental group to which he or she was assigned. For risk-neutral subjects, this probability was linear in points,  $P(x) = m + nx$ , where  $x$  is the number of points earned and  $m$  and  $n$  are parameters used to effect a linear transformation to the  $[0,1]$  probability scale. For risk-averse subjects, this probability was concave in points,  $P(x) = m + n(-e^{-0.06x})$ . These probability functions were in effect derived utility functions (see Berg *et al.*, 1986, for a proof). Assuming that subjects prefer \$1.00 over \$0.00 and maximize expected utility, their behavior in the experimental setting

<sup>6</sup> The task was a variation of that used by Chow (1983) and Waller & Chow (1985).

<sup>7</sup> Constraints regarding subject availability and the experimental setting precluded a design that crossed order and pay schemes.

should be consistent with maximization of  $E[P(x)]$ .<sup>8</sup>

### Subjects

Subjects were 51 upper-level accounting majors enrolled in a cost accounting course. All subjects had taken elementary economics and statistics courses, and had covered basic decision theory.

### Procedure and task

*First period.* The procedure and task in the first period involved the following: (1) Subjects were told how their performance would be measured, how the number of points earned depended on performance, and how the probability of winning \$1.00 depended on the number of points earned. (2) Subjects made state-contingent estimates of their performance. (3) The state was determined using a random event generator. (4) Subjects performed the decoding task. (5) Each subject's performance was measured, and his or her probability of winning \$1.00 was determined. (6) The lottery was played.

Performance was measured in terms of the number of "symbol-groups" correctly decoded, with a minimum of zero and maximum of 20. The size of a symbol-group was a random state variable with a probability distribution of 0.15 for five symbols, 0.50 for seven symbols, and 0.35 for nine symbols. On each subject's worksheet, the symbols to be decoded were displayed in 20 rows of nine symbols. If the size of a symbol-group happened to be five (seven, nine), then the first five (seven, nine) symbols in a row had to be decoded correctly to get credit for one symbol-group. In a given period, the size of all symbol-groups was the same.

Subjects were told that the points earned for performance in the first period would be piece-rate, five points for every symbol-group correctly completed. They were provided with one

of two tables showing the relationship between the number of points earned (zero to 100, in increments of five) and probability of winning \$1.00 at the end of the period. For risk-neutral subjects, the table showed a linear relationship with zero points yielding a 0.00 probability, five points yielding a 0.05 probability, ten points yielding a 0.10 probability, and so on, up to 100 points yielding a 1.00 probability. For risk-averse subjects, the table showed a nonlinear relationship with zero points yielding 0.0000 probability, five points yielding a 0.2598 probability, ten points yielding a 0.4523 probability, and so on, up to 100 points yielding a 1.0000 probability. Entries in the latter table were generated using the concave function described earlier.

Before the state was determined, subjects were asked to make three state-contingent estimates of their performance for the period—for example: "If the size of a symbol-group is five, my best estimate is \_\_\_\_\_ symbol-groups." Subjects wrote their estimates in a booklet which they kept until the end of the experiment. These estimates, together with the state probabilities, constituted the subjects' performance probability distributions.

The symbol-group size for the period was determined using a random event generator. A spinner was affixed to a transparency displaying a probability wheel (Fig. 1). Using an overhead projector, the probability wheel was clearly visible to all subjects. Subjects were told that, when the spinner was spun, if it stopped between 0.00 and 0.15 then the symbol-group size would be five, if it stopped between 0.15 and 0.65 then the size would be seven, and if it stopped between 0.65 and 1.00 then the size would be nine. The spinner was spun and happened to stop between 0.15 and 0.65. Thus, for the first period, each subject had to decode correctly the first seven symbols in a row to get credit for one symbol-group.

Subjects performed the task for 3 minutes, and

<sup>8</sup> The key assumption underlying the Berg *et al.* (1986) technique with respect to expected utility theory is conformance to the "no-fun-in-gambling" axiom. Let  $(p, A; 1-p, B)$  designate a lottery with a probability  $p$  of receiving  $A$  and a probability of  $1-p$  of receiving  $B$ . Let  $[I]$  designate an indifference relation. For probabilities  $p, q$ , and  $r$ , this axiom states:

$(r(p, A; 1-p, B); 1-r(q, A; 1-q, B)) [I] (pr+q-qr, A; 1-pr-q+qr, B)$ .

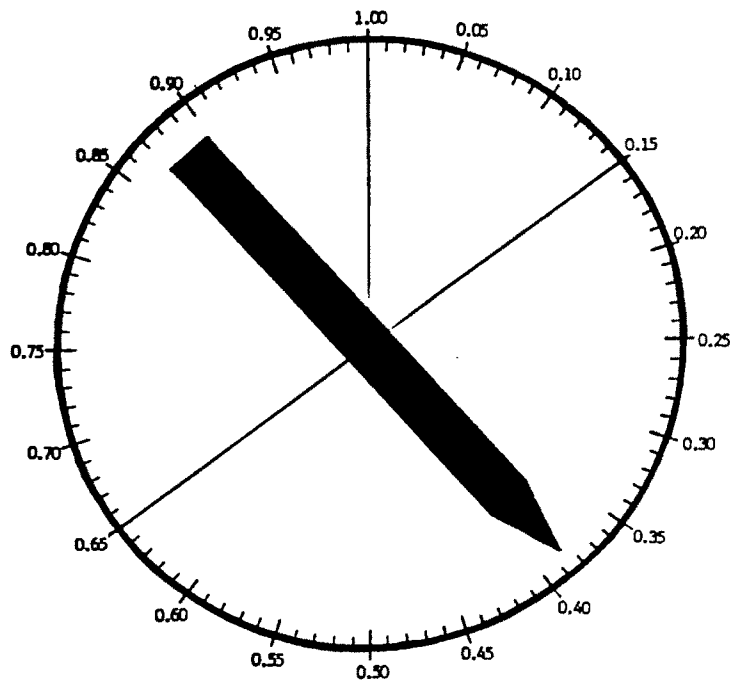


Fig. 1.

their performance was measured in terms of symbol-groups, points, and the probability of winning \$1.00 in accordance with the assigned point-probability table. Finally, the spinner was spun again. For a given subject, if it stopped at a value equal to or less than his or her probability of winning \$1.00, then he or she won \$1.00. If it stopped at a value greater than this probability, then he or she received nothing.

*Second period.* The procedure and task in second period were similar to those of the first, with two exceptions. First, a budget-based pay scheme was used instead of a piece-rate scheme. Second, the budget was participatively set, after the performance estimates were made but before the state was determined.

Subjects were told that the budget-setting process would consist of the experimenter recommending a tentative budget (fifteen symbol-groups), and they would individually revise the

budget to a desired level. They were told that the pay scheme would consist of base pay plus a bonus or minus a penalty. The tentative amount of base pay, which was associated with the tentative budget, was 60 points (fifteen times four points). The ultimate amount of base pay was four points times the revised budget. The bonus, if any, was six points times the number of symbol-groups by which performance exceeded the revised budget. The penalty, if any, was eight points times the number of symbol-groups by which performance fell short of the revised budget.<sup>9</sup> In terms of equation (1),  $B' = 60$  points,  $y' = 15$  units,  $a = 6$  points,  $b = 4$  points, and  $c = 8$  points. Because  $b < a < c$ , there was an incentive to create slack.

After a description of the pay scheme, subjects were presented with one of two tables showing the relationship between points earned (zero to 120, in increments of two) and the probability of

<sup>9</sup> Subjects were told that the penalty was constrained such that it would never exceed base pay, i.e., total pay in points would never be negative. This constraint was included to limit the range of possible points earned, which facilitated the construction of derived utility functions. Absent this constraint, a subject would have had to set a high budget and then perform very poorly in order to earn negative points.

winning \$1.00. Entries in the tables were based on the same underlying linear and concave functions used in the first period. Subjects made three state-contingent estimates of performance and wrote them in their booklets.

Subjects then were shown a series of examples illustrating the computation of total pay in points based on the pay scheme and assumptions about a hypothetical subject's revised budget and actual performance. Each subject determined a revised budget, wrote the budget figure in his or her booklet and on a piece of paper, and gave the piece of paper to the experimenter. The last step was included as a control over subjects changing their budgets after learning which state occurred.

The probability wheel was spun to determine the symbol-group size for the period. Subjects performed the decoding task for 3 minutes, their performance was measured in terms of symbol-groups, points, and the probability of winning \$1.00, and the lottery was played.

**Third period.** The procedure and task in the third period were very similar to those of the second, except that new values were used for base pay and the bonus parameter. The tentative amount of base pay was 90 points (fifteen times six points). The ultimate amount of base pay was six points times the revised budget. The bonus, if any, was four points times the number of symbol-groups by which performance exceeded the revised budget. The series of examples involving the computation of total pay in points for a hypothetical subject was changed accordingly. In terms of equation (1),  $B' = 90$  points,  $y' = 15$  units,  $a = 4$  points,  $b = 6$  points, and  $c = 8$  points. Because  $a < b < c$  and  $[c-b]/[c-a] = 0.50$ , there was an incentive (at least for risk-neutral subjects) to set the budget equal to the median of the performance probability distribution.

**Debriefing.** Subjects completed a questionnaire which included items eliciting effort preferences regarding the decoding task and manipulation checks regarding risk preferences and the pay schemes' truth-inducing feature. To elicit effort preferences, subjects were asked "What is your basic attitude toward exerting ef-

fort on the decoding task?" Subjects responded on an eleven-point scale with the following anchors: "I really dislike exerting effort on the task" (0), "I am indifferent about exerting effort on the task" (5), and "I really like exerting effort on the task" (10). Below, this is referred to as effort preference measure 1. Subjects also were asked "What level of *intrinsic* reward did you get from performing the decoding task?" and responded on an eleven-point scale with the following anchors: "very low intrinsic reward" (0), "moderate intrinsic reward" (5), and "very high intrinsic reward" (10). Below, this is referred to as effort preference measure 2.

The manipulation checks for the pay schemes' truth-inducing feature were as follows. After briefly describing the pay scheme used in the second period again, subjects were asked "Did this pay scheme tend to make you set your revised standard equal to, lower than, or higher than your best estimate?" Subjects responded on an eleven-point scale with the following anchors: "Pay scheme made me set standard lower than best estimate" (0), "Pay scheme made me set standard equal to best estimate" (5), and "Pay scheme made me set standard higher than best estimate" (10). This procedure was repeated in another item for the pay scheme used in the third period.

The manipulation checks for risk preferences were as follows. Subjects were again shown the point-probability table used in the first period for their group. For each of three items, they were asked to state their preferences between two lotteries. The first item asked "Which do you prefer? (1) Getting 40 points for sure, (2) A 0.50 probability of getting 80 points and a 0.50 probability of getting 0 points, (3) I am indifferent between (1) and (2)." The second item asked "Which do you prefer? (1) A 0.50 probability of getting 80 points and a 0.50 probability of getting 0 points, (2) Getting 35 points for sure, (3) I am indifferent between (1) and (2)." The third item asked "Which do you prefer? (1) A 0.80 probability of getting 20 points and a 0.20 probability of getting 0 points, (2) A 0.50 probability of getting 40 points and 0.50 probability of getting 0 points, (3) I am indifferent between (1)

ad (2)." Based on their respective point-probability tables, risk-neutral subjects should choose the alternatives (3), (1), and (2), while risk-averse subjects should choose the alternatives (1), (2), and (1).

### Measures

Slack was measured by the difference between each subject's estimated performance and participatively set (revised) budget. Estimated performance was the estimated number of symbol-groups to be completed correctly conditioned on the size of a symbol-group being seven, i.e. the median (and mode) of the performance probability distribution.<sup>10</sup> Performance was the actual number of symbol-groups completed correctly. A composite effort preference measure was the sum of effort preference measures 1 and 2. In addition, there were manipulation checks as described above.

## RESULTS

### Preliminary analyses

Table 1 presents descriptive statistics for each

group and overall. To assess whether the random assignment of subjects to groups was successful, *t*-tests were performed comparing the groups in terms of first period performance, effort preferences, and estimated performance in each period. The groups did not differ in terms of first period performance ( $t = 1.10, p > 0.27$ ), effort preferences ( $t = 1.42, p > 0.16$ ), estimated performance for the first period ( $t = 1.06, p > 0.29$ ), estimated performance for the second period ( $t = 0.73, p > 0.47$ ), or estimated performance for the third period ( $t = 0.63, p > 0.53$ ). These results suggest that the randomization was successful.

Effort preference measures 1 and 2 were highly correlated ( $r = 0.70, p < 0.001$ ). Also, the mean of effort preference measure 1 (6.71) was between the anchors "I am indifferent about exerting effort on the task" (5) and "I really like exerting effort on the task" (10), and the mean of effort preference measure 2 (6.20) was between the anchors "moderate intrinsic reward" (5) and "very high intrinsic reward" (10). A reasonable inference is that effort aversion was not an im-

TABLE 1. Descriptive statistics

|                             | Overall      | Risk-neutral<br>group ( $n = 26$ ) | Risk-averse<br>group ( $n = 25$ ) |
|-----------------------------|--------------|------------------------------------|-----------------------------------|
| Effort preference 1         | 6.71 (2.33)  | 6.31 (2.33)                        | 7.12 (2.32)                       |
| Effort preference 2         | 6.20 (2.29)  | 5.77 (2.18)                        | 6.64 (2.36)                       |
| Composite effort preference | 12.90 (4.27) | 12.08 (4.28)                       | 13.76 (4.17)                      |
| First period:               |              |                                    |                                   |
| Estimated performance       | 13.69 (3.13) | 13.23 (3.09)                       | 14.16 (3.16)                      |
| Performance                 | 8.24 (2.35)  | 7.89 (2.63)                        | 8.60 (2.00)                       |
| Second period:              |              |                                    |                                   |
| Estimated performance       | 9.82 (2.09)  | 9.62 (2.37)                        | 10.04 (1.77)                      |
| Budget                      | 7.88 (3.06)  | 7.31 (3.21)                        | 8.48 (2.83)                       |
| Slack                       | 1.94 (2.28)  | 2.31 (2.22)                        | 1.56 (2.33)                       |
| Performance                 | 10.35 (1.97) | 10.35 (1.90)                       | 10.36 (2.08)                      |
| Third period:               |              |                                    |                                   |
| Estimated performance       | 9.90 (1.97)  | 9.73 (2.15)                        | 10.08 (1.80)                      |
| Budget                      | 9.08 (1.95)  | 9.27 (2.16)                        | 8.88 (1.72)                       |
| Slack                       | 0.82 (1.34)  | 0.46 (1.24)                        | 1.20 (1.35)                       |
| Performance                 | 9.98 (2.59)  | 9.92 (2.28)                        | 10.04 (2.92)                      |
| Change in slack             | -1.12 (2.05) | -1.85 (2.20)                       | -0.36 (1.58)                      |

\*values in the table are means with standard deviations in parentheses.

<sup>10</sup> A sensitivity analysis was performed in which estimated performance was replaced by the expected value of the performance probability distribution (see below).

portant factor and that subjects generally tried to maximize performance.

Subjects tended to overestimate their performance in the first period but were very accurate in the second and third periods. Assuming that subjects attempted to maximize performance, there was an apparent learning effect from the first to second periods. The increase in performance was significant for the risk-neutral group ( $t = 7.70, p < 0.01$ ) and risk-averse group ( $t = 5.63, p < 0.01$ ). However, it appears that no further learning took place from the second to third periods. For the risk-neutral group, there was no change in performance ( $t = 0.97, p > 0.34$ ) or expected performance ( $t = 0.22, p > 0.83$ ). Similarly for the risk-averse group, there was no change in performance ( $t = 0.91, p > 0.36$ ) or expected performance ( $t = 0.13, p > 0.90$ ). Although the budgets for the risk-neutral and risk-averse groups did not differ in the second period ( $t = 1.38, p > 0.17$ ) or third period ( $t = 0.71, p > 0.48$ ), the increase in budgets from the second to third periods was significant for the risk-neutral group ( $t = 3.02, p < 0.01$ ) and insignificant for the risk-averse group ( $t = 0.86, p > 0.39$ ).

The manipulation of the pay schemes' truth-inducing feature was checked by comparing the subjects' responses regarding the perceived ef-

fect of each scheme in setting the budget with respect to estimated performance. The mean response for the truth-inducing scheme was 5.0 (S.D. = 1.6), exactly equal to the anchor "Pay scheme made me set standard equal to best estimate." The mean response for the slack-inducing pay scheme was 3.8 (S.D. = 2.2), which is significantly lower ( $t = 3.72, p < 0.01$ ) and closer to the anchor "Pay scheme made me set standard lower than best estimate." These results indicate that the manipulation of the pay schemes' truth-inducing feature was successful.

The manipulation of risk preferences was checked by examining the association between assigned risk preferences and choices of lotteries in the debriefing questionnaire. Table 2 presents the results. For all three items, the association was significant ( $p < 0.01$ ), using a chi-square test. An examination of the cell data for the second and third items clearly indicates that subjects' choices corresponded with the assigned risk preferences. The interpretation of the data for the first item is less clear. Although risk-averse subjects strongly preferred the predicted alternative, risk-neutral subjects did not. One explanation is that the risk-neutral subjects were indifferent between alternatives 1 and 2, as predicted, but expressed their indifference by randomly choosing between them rather than

TABLE 2. Manipulation checks for risk preferences

|                                          | Risk-averse group | Risk-neutral group |
|------------------------------------------|-------------------|--------------------|
| First item alternatives:                 |                   |                    |
| (1) 1.00 chance of 40 points*            | 20                | 11                 |
| (2) 0.50 (0.50) chance of 80 (0) points  | 3                 | 13                 |
| (3) Indifference†                        | 2                 | 2                  |
| Second item alternatives:                |                   |                    |
| (1) 0.50 (0.50) chance of 80 (0) points† | 6                 | 22                 |
| (2) 1.00 chance of 35 points*            | 18                | 3                  |
| (3) Indifference                         | 1                 | 1                  |
| Third item alternatives:                 |                   |                    |
| (1) 0.80 (0.20) chance of 20 (0) points* | 18                | 4                  |
| (2) 0.50 (0.50) chance of 40 (0) points† | 5                 | 20                 |
| (3) Indifference                         | 2                 | 2                  |

\*Predicted alternative for the risk-averse group.

†Predicted alternative for the risk-neutral group.

signating alternative 3. Overall, although somewhat mixed, the results indicate that the manipulation of risk preferences was successful. However, it should be noted that, with respect to the computation of  $E[p(x)]$ , the manipulation check items involved a simpler task than that in the experimental setting.

#### *Hypotheses tests*

*H1* predicts that both risk-neutral and risk-averse subjects create slack under the slack-inducing scheme. Using the data from the second period, a *t*-test with the null hypothesis that mean slack equals zero was performed for each group. Mean slack of 2.31 for the risk-neutral group is significantly greater than zero ( $t = 5.31$ ,  $p < 0.01$ ), as is mean slack of 1.56 for the risk-averse group ( $t = 3.35$ ,  $p < 0.01$ ).<sup>11</sup> These results support *H1*.

*H2* predicts that, when a truth-inducing scheme is introduced, the decrease in slack is greater for risk-neutral subjects than for risk-averse subjects. For each subject, the difference of slack under the slack-inducing scheme minus slack under the truth-inducing scheme was computed. An analysis of variance was performed using the change in slack as a dependent variable, risk preferences as a between-subjects factor, and the composite effort preference measure as a covariate. Risk preferences had a significant effect on the change in slack ( $F[1,50] = 7.34$ ,  $p < 0.01$ ). The covariate did not have a significant effect ( $F[1,50] = 0.15$ ,  $p > 0.70$ ). The mean change in slack for risk-neutral subjects was 1.85, a significant decrease from 2.31 to 0.46 ( $t = 4.3$ ,  $p < 0.01$ ). The mean change for risk-averse subjects was only 0.36, an insignificant decrease from 1.56 to 1.20 ( $t = 1.14$ ,  $p > 0.27$ ).<sup>12, 13</sup> These results support *H2*.

#### CONCLUDING REMARKS

This study has contributed evidence that worker risk references are an important determinant of slack in participative budgeting when a (conventional) truth-inducing pay scheme is introduced. The results showed that both risk-neutral and risk-averse subjects created slack under a slack-inducing pay scheme. When a truth-inducing scheme replaced the slack-inducing scheme, slack decreased significantly for risk-neutral subjects but did not change for risk-averse subjects. An implication is that, in the design of a truth-inducing pay scheme, managers should take worker risk preferences into account. An erroneous assumption that workers are risk-neutral when they are in fact risk-averse may impair the scheme's informational benefits. Also, with respect to method, this study has contributed further evidence in support of the Berg *et al.* (1986) technique as a means by which to test the effects of risk preferences in experimental settings (see also Berg *et al.*, 1985; Balman & Lewis, 1985).

Four caveats should be noted. First, the strength of the association between risk aversion and slack depends on the specific conditions of a participative budgeting context, including the production function, probability distribution of the state variable, and degree of worker risk aversion. It is not suggested that risk aversion always causes slack. Second, factors in addition to pay incentives and risk preferences apparently affected slack. In particular, the slack-inducing scheme provided an incentive to set the budget at zero, yet subjects generally set the budget well in excess of zero. This result is consistent with that reported by Chow *et al.* (1986). Third, the experimental setting assumed away

<sup>11</sup> The between-groups difference in slack under the slack-inducing scheme was not significant ( $t = 1.17$ ,  $p < 0.24$ ).

<sup>12</sup> The between-groups in slack under the truth-inducing scheme was significant ( $t = 2.03$ ,  $p < 0.05$ ).

<sup>13</sup> Two additional tests were done. In the first test, estimated performance was replaced by the expected value of the performance probability distribution in the measure of slack. The mean change in slack was 1.86 for risk-neutral subjects and 0.46 for risk-averse subjects. An analysis of variance indicated that the change in slack was affected significantly by risk preferences ( $F[1,50] = 6.48$ ,  $p < 0.02$ ) and not significantly by effort preferences ( $F[1,50] = 0.01$ ,  $p < 0.90$ ). The second test was a Mann-Whitney *U*-test, which indicated a significant between groups difference in the change in slack ( $p < 0.01$ ).



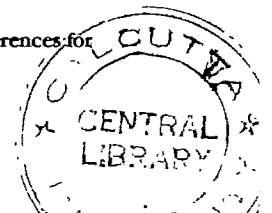
complications other than risk aversion that may impair the effectiveness of a truth-inducing pay scheme. For example, there was no pre-production allocation of resources to a worker based on the participatively set budget. But, when a manager uses information provided by workers for allocating limited resources to them, the truth-inducing feature of the scheme used in this study may be impaired (Loeb & Magat, 1978; Conn, 1979), and it may be necessary to consider alternative schemes (Groves, 1973; Green & Laffont, 1977). This complication should be examined by future empirical research.

Fourth, although manipulating risk preferences facilitated hypothesis testing, there remains an external validity question as to the nature of real-world workers' risk preferences in participative budgeting contexts. If these workers are risk neutral, the concern raised in this paper about conventional truth-inducing schemes is not warranted. One approach to resolving this question would be to conduct field studies on worker risk preferences. But, the mea-

surement problems circumvented by the Berg *et al.* (1986) technique would reappear, and improved methods for measuring utility functions would be needed. An alternative approach, which is consistent with Itami's (1975) theoretical solution to the problem of superior-subordinate risk incongruence, would be to use the Berg *et al.* (1986) technique to manipulate workers' risk preferences *in real-world settings*. With respect to performance-based incentive pay, workers might be initially paid in terms of points, which would be associated with the probability of receiving an end-of-period amount of pay according to a (derived utility) function selected by management. This approach might provide a practical solution to the risk incongruence problem discussed by Itami (1975). Further, if management selects a linear function, it might eliminate one factor (i.e. worker risk aversion) impairing the effectiveness of truth-inducing schemes in participative budgeting contexts.

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## BIBLIOSCENE

## PRODUCING KNOWLEDGE THAT IS GENERALIZABLE AND USABLE FOR PRACTICE: A REVIEW

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- Clive Emmanuel & David Otley, *Accounting for Management Control* (Wokingham, U.K.: Van Nostrand, Reinhold, 1980).  
Norman B. Macintosh, *Social Software of Accounting and Information Systems* (Chichester: John Wiley, 1985).  
Kenneth A. Merchant, *Control in Business Organizations* (Cambridge: Ballinger, 1985).

If these three books are representative of current thinking and research about the behavioral aspects of accounting, then the field is alive and well.

The very success of these books helps to raise several questions about the future of research and teaching that I should like to explore. I will review the Macintosh and Emmanuel & Otley books first, and then the Merchant book. The reason for the separation will, I hope, become apparent.

Macintosh suggests that designing and administering accounting and information systems requires dealing with the "social software" as well as the technical aspects of such systems. The purpose of the book is to bring most of the important research knowledge that has been produced on this subject to the attention of students, managers, and academics. The author integrates the findings wherever possible, but he warns the readers that they will not find one general all-encompassing theory.

The author produces two intriguing models. A first one depicts the influence of technology on the design and implementation of information systems. The second is a model of management control systems. The combined models describe

the mechanisms by which a systematic linking occurs between work-unit technology and accounting and information systems.

The book is a delight in its careful description of problems, its analysis of how research can be used to understand the problems, and its methodically stated set of conclusions and advice to the practitioner. The analysis made by Macintosh of the strengths, gaps, and inconsistencies of the existing research plus the models that he presents should serve as a basis for further research by scholars.

The Emmanuel & Otley book is a bit less comprehensive in the review and analysis of the literature. The authors have selected some of the best research literature on the problems of managing or controlling programmed and nonprogrammed decisions. They provide a thoughtful review of the concepts, how they may be used, as well as potential limits.

They distinguish between the control of programmed and nonprogrammed decisions because they believe that the technologies utilized by each produce different human problems. In the case of the programmed decisions, the predictive model is explicit and available to managers and their subordinates. Hence, implementa-

is relatively straightforward. The predictive models for nonprogrammed decisions are largely implicit in the minds of individuals. The authors conclude that these models are better developed by people at lower levels in the organization because they are the ones to implement what is desired.

Emmanuel & Otley embed their entire discussion in the larger context of designing and managing organizations. They provide the reader with an array of ideas on organizational design and human motivation. Macintosh also embeds his perspective in the organizational context. However, his review of the organizational literature is more focused because he is intrigued with the question, how do the structural uncertainties of environment, goals and technologies influence the accounting and information systems?

The authors of these two books frame their arguments and develop their models by relying on rigorous research. By rigor, I mean simply that research and inquiry that strive to the scrupulously accurate, precise, strict, and that does not knowingly permit evasion or escape of poor reasoning or inquiry. Scholars believe that the technology for rigorous research is the best available means to ensure that researchers are not kidding themselves or others. Researchers seek the truth. They realize, however, that all they can do is approximate it, point out the gaps, and work hard to close them in future work. They strive to be realistic and humble about the applicability of the research, cautioning the reader not to make too hasty extrapolations.

The difficulty with this position is that the technology of rigorous research may, in addition to seeking the truth, at the same time, inhibit finding it, especially if the purpose of the knowledge produced is not only to understand and explain but to be the basis for action. And this is the central task of the practitioner to whom all three books are addressed in varying degrees.

Some scholars separate understanding and action. But this raises the question of what is the nature of understanding and explanation that cannot be used to take action? Imagine a relatively complete explanation of cancer from

which one cannot derive specific actions on how to cure it.

Some readers may point out that as research becomes more complete, the knowledge will become more applicable. Unfortunately, this perspective receives little support in several reviews of research related to "software" issues. Research results apparently are rarely additive. And when they are, it is usually to provide a more complete understanding of reality and not to provide usable advice on how to act to deal with the online activities of everyday life that a manager faces (Argyris, 1980).

For example, Macintosh reviews the research on expert judgement processes. He then discusses how the "Brunswick lens" model can be used to understand expert clinical judgement and how the model was the source of interesting research on auditing and investment security evaluation. He concludes that the judgement of experts is remarkably unreliable, especially for more complex tasks; however individual experts are consistent in their judgement over time.

Macintosh then advises that information professionals should take on a more proactive role in interpreting information during the decision-making processes being very careful not to usurp the decision maker. The advice stops there. But, in my experience, that is precisely the point where many professionals get in trouble. They may "interpret" information in ways that line managers see as "telling" them what to do and the line managers are unaware of the unintended impact. Or, they interpret information in such a careful manner than line managers become frustrated. Often the line managers try to hide their disappointment and often they fail to do so but think they have succeeded. Both books advise a more proactive role, but their advice is related to designing information systems and less the online behavior required to be more proactive in their relationships with line managers.

But even the understanding and explanations available are self-limiting. It is unlikely, I believe, that practitioners can keep in mind all the nuances that Macintosh or Emmanuel & Otley

describe. Indeed, it is unlikely that the authors themselves can store and retrieve all the knowledge in their respective books in an online manner. The user would have to carry around the Macintosh or the Emmanuel & Otley books as external memories.

Under what conditions is that feasible? I suggest primarily in using the knowledge to design information systems. The three authors, I believe, would maintain that an important step to using information systems is to have the right ones. Each book outlines the information systems that are best for programmed and nonprogrammed decisions as well as those with high or low degrees of uncertainty. But neither has very much to say that is rigorous about the problems of online usability.

Nor, at times, is the description as adequate as the argument requires if informing action is as important as producing understanding. For example, we learn that the McNamara type of budgeting system may have been valid for the automobile industry while less valid for jungle warfare (more uncertainty and more nonprogrammable decisions). One result is that field commanders covered themselves by such acts as producing fictitious information.

It would have been helpful to include a more thorough description of the commanders' behavior that led to the distortions as well as what were the actual information systems in the automobile companies and in the combat zones. Such a description would not only provide more insight into the actions taken and why; it would also show, I believe, that people produced much fictitious information in the automobile plants. The difference was that they could cover it up and cover up the cover-up.

Or, if it is true that individuals vary in cognitive styles, and that cognitive styles are so important that the design of information systems should take these styles into account, and if cognitive styles show variance, then how do we explain the consistency of distorting information across so many different managers and under conditions that are as different as an automobile plant and the battlefield. One possibility is that when human beings *implement* their actions,

the differences in cognitive styles wash out.

If, as both books recommend, managers use different information systems for different tasks (e.g. tasks that are easily programmable and those that are not), then what action skills will manager's require to manager others with different information systems?

In summary, the first two books are rigorous about understanding and explaining information systems that will lead to helpful advice about designing information systems. They are less helpful in deriving actions to be taken by managers. More research is needed that will provide understanding of how to implement the different designs that are recommended under online conditions. We should not be surprised if such research may feed back to alter our understanding of design and information systems.

Merchant also knows the research literature. However, he uses it in a somewhat different manner. Whereas the first three authors use the research literature as figure and practical problems as ground, Merchant reverses what is figure and what is ground. He shows more concern for the line manager.

In order to examine this argument more carefully, I should like to present a framework of the aspirations that scholars and practitioners hold in carrying out their respective activities. Such a framework is outlined in Fig. 1.

Embedded in these different frames are important differences about what each actor seeks. The researchers seek neutrality, completeness, and precision. The practitioners take normative stances, appropriate incompleteness, and fuzziness that is designed to be appropriately precise.

These are nontrivial differences. Whenever researchers and practitioners have serious disagreements, they typically deal with each other by acting with integrity. Integrity means that the players stick to their principles and values. In doing so, researchers focus on the left-hand column and practitioners on the right-hand column. The result is often a polarization which, in turn, results in each side attributing nasty motives to the other as well as undermining what each could teach the other.

What actions could researchers take to reduce

| Scholars aspire to                                                                                       | Practitioners aspire to                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (1) Understand the world as it is                                                                        | (1) Create the world as they would like it to be                                                                                                             |
| (2) Adopt a neutral stance as to what the world should look like                                         | (2) Adopt a normative stance as to what the world should look like                                                                                           |
| (3) Test ideas until they are certain they have ruled out completing explanations and then use the ideas | (3) Test ideas while they are using them. Keep an eye out for competing explanations, and decide whether to deal with them, ignore them, or squash them.     |
| (4) Conduct research with no self-fulfilling prophecies                                                  | (4) Produce self-fulfilling prophecies                                                                                                                       |
| (5) Separate discovery from implementation                                                               | (5) Produce discovery through reflection on implementation                                                                                                   |
| (6) Place faith in additivity of knowledge to move from discovery to implementation                      | (6) Doubt that scientific knowledge is additive and even if it were, it is difficult to store in the human mind and retrieve it when it is necessary to act. |

Fig. 1. A comparison of the aspirations of scholars and practitioners.

the polarization? First, researchers might reflect on their own actions when they are acting as parents, administrators of departments, participants in faculty meetings, etc. They will conclude, I suggest, that their actions are more consistent with the right-hand column. I would also suggest that when their actions are more consistent with the left-hand column, they are probably producing knowledge that leads to the "thoughtful" inaction for which scholars are famous.

I am reminded of an experience with Mr James Rouse, the famous city planner and builder. He invited half a dozen scholars to advise him on Columbia, a city still in the design stage. After two days of intensive listening, he concluded that the most important information he gained from social scientists was the dangers of building. He told me, "If I took social scientists seriously, I would never build Columbia." To his credit, he knew how to take them seriously while not immobilizing himself with the doubts they communicated, carefully derived from research.

Second, researchers could accept the right-hand column as an important focus for their rigorous research. Researchers, for example, could study problems of creating worlds (not only designing them); identifying and taking normative stances; producing generalizations that actors can use to bring about intended con-

sequences and, at the same time, as tests of theories; producing self-fulfilling processes while learning how to interrupt them when they are counterproductive; and discovering generalization by online reflection while implementing designs.

Researchers would not only describe the right-hand column, they would ask why is it used so often. What is so compelling about these activities that most people use them in everyday life? What kinds of generalizations and rules must they have in their heads in order to use them?

Similar questions could be asked about accounting information systems. The left-hand column dominates the research on design; the right-hand column on the use or implementation. If we are to make our knowledge usable and valid for action, then somehow we must study rigorously the bridging of these two perspectives.

The task will be difficult because in order to conduct rigorous experimental and correlational research, I suggest scholars will use similar theories of unilateral control and power as embedded in most pyramidal organizations (Argyris, 1980). Thus, although Macintosh, and Emmanuel & Otley suggest different information systems for different bureaucratic vs organic systems, the research methods used by the scholars they quote are consistent with the theories of ac-

tion embedded in bureaucratic organizations. The result is propositions that suggest different designs of information for bureaucratic and organic organization that are "blind" to the possibility that when the different designs are implemented, the differences will wash out or that rigid bureaucratic organization may profit from information systems more akin to those seen as needed by an organic organization because they may help to unfreeze the bureaucratic rigidity.

Merchant appears to me to have a theory about educating managers to use control in business organizations which is more compatible with the right-hand column. His book is closer to taking action; action that produces self-fulfilling prophecies; action that is guided by propositions that are designedly sloppy yet usable.

Merchant begins with a set of questions that managers would find more relevant. Why do managers have to implement controls; what is a good control; how to choose from among alternative controls; how to tighten or loosen controls; and what can go wrong when controlling.

Unfortunately, there is less rigorous research designed to answer them. Merchant attempts to fill in the void by using testimony from executives and stories embedded in case studies. The difficulty with this approach is that he does not inform the reader of the gaps and holes in his position (as do the other authors of their position). The practitioners are not offered a method to reflect on their practice; nor how to use their actions to test the theory that is embedded in the book. Yet it would be valuable for the practitioners to continue to test and reformulate the theory whenever it is necessary. It would also be helpful to the scholars to learn of the changes that were necessary.

For example, Merchant emphasizes more than the other authors the games people play with control systems. Yet after having described them, he says very little about how to engage with them in order to reduce them. Indeed, he comes closer to the stance of the first two books which is to design information systems and actions that bypass the games. If this advice is used, it will reinforce the games because bypassing them requires covering up the bypass which, in

turn, covers up the games and permits them to flourish.

There are two other problems that are embedded in the assumption that research should be used to reduce ignorance. First, it is not possible to know everything one needs to know ahead of time. Indeed, the more people believe that they know ahead of time what they need to know, the more likely they are to become closed or blind to new information, especially information that is contradictory to their biases. This, in turn, may lead others to conclude that they are uninfluenceable. Both stances may activate defensive routines and cover up that they are covering up. The end result is more distorted information.

The second problem is that effective action may require, at times, designed ignorance. The task is to fill the gap created either by not being able to know everything ahead of time or by having designed one's ignorance. Such online gap filling requires a theory and a method of gap filling that would be taught to all practitioners.

Any theory of gap filling would include the actor as a gap filler. How do managers organize and enact reality? What kinds of maps do practitioners need in order to take action? For example, it appears that features of "action maps" are different from features of maps of understanding that the first two books utilize. Action maps describe how to get from here to there; focus on self-sealing processes, and result in generalizations that are consistent with producing the conditions on the right-hand column in Fig. 1 (Argyris, 1985).

If to be rigorous is to be scrupulously accurate, to permit no evasion or escape from the reality being studied, then the greater the gap between understanding and action, the less the rigor, even though the research is rigorously designed and executed.

The next step is to develop theories of action that are as testable, disconfirmable and generalizable as are normal science theories. These theories will ultimately contain propositions about understanding *and* about taking action which a practitioner can use to act *and* simultaneously to test the theory (Schön, 1983).



## UNDERSTANDING ORGANIZATIONAL CHANGE: OMB AND GAO — A REVIEW

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Frederick C. Mosher, *A Tale of Two Agencies: A Comparative Analysis of the General Accounting Office and the Office of Management and Budget*, (Baton Rouge: Louisiana State University Press, 1984)

and

Wallace Earl Walker, *Changing Organizational Culture: Strategy, Structure and Professionalism in the U.S. General Accounting Office*, (Knoxville: University of Tennessee Press, 1986).

Despite the long-standing and growing interest in organizations, there is still a dearth of closely observed and theoretically informed studies of governmental agencies. Frederic C. Mosher's *A Tale of Two Agencies: A Comparative Analysis of the General Accounting Office and the Office of Management and Budget*, and Wallace Earl Walker's *Changing Organizational Culture: Strategy, Structure and Professionalism in the U.S. General Accounting Office* admirably fulfill that need. Taken together, as I hope they will be, these volumes themselves could constitute a short course on organizational change. They are marvellously complementary: as Walker says, "His (Mosher's) looks from the outside in and from the top down, mine from the inside out and the bottom up" (p. 4). Since Mosher (correctly described by Kenneth W. Thompson and James Sterling Young as "the doyen of American public administration scholars") compares GAO and OMB, while Walker (a career military officer who teaches at West Point) compares the army he knows so well to GAO, their joint range is remarkable.

Mosher's problem is to discover how GAO and OMB maintain credible expertise together with political responsiveness as the nation

changes dramatically from small to large government. Basically, OMB changes from its inception in 1921 as a force for parsimony in government to a staff arm of the president, and GAO changes from the most formalistic (in the 1920s) to the most penny-pinching (in the 1930s) executive accounting firm, to an agency supplying Congress with program evaluations in the 1970s. After the GAO's narrow, legalistic pre-audit threatened to stymie New Deal innovative programs, President Franklin Roosevelt tried to make it responsible to him and confine it to post-audit. He lost, but he won, as the 15 year term of the Comptroller General eventually gave way to a new head who redefined GAO's mission. Gradually GAO sought to prescribe general accounting and auditing principles, giving up most detail, decentralizing initiative to agencies subject to periodic sample audits on site. By 1954, GAO had cut its total personnel substantially while greatly increasing its roster of professionals, all the while vastly diminishing the records it kept on file.

Starting in 1966, with the appointment of Elmer Staats as Comptroller General, a politically-savvy and academically-oriented official whose career had lain within OMB, GAO was

once again transformed. It vastly increased its work for, and relations with, Congress. It became a specialist in program evaluation. Accounting, while still important, gave way grudgingly yet firmly to policy analysis.

The Bureau of the Budget (later OMB) underwent a similar evolution but with a crucial difference — from small matters of economy until the late 1930s to a neutral staff through the mid-1940s to the responsive arm of the presidency it has been until today. The difference is that because presidents insisted on responsiveness (otherwise they would not take advice or provide guidance) they have been able to use OMB to support whatever vision of national policy they were able to generate. However, as dissensus has grown over the budget — how much should be spent for what, and paid for by whom — the qualities of trust and neutrality which Mosher believes to be essential for OMB's continuance as a highly competent staff for the central government, have been deeply eroded. As presidential budget proposals (asking prices, really) are routinely pronounced "dead on arrival," Mosher makes the reader aware that the creation of new institutions devoted to policy research and analysis — the Congressional Budget Office, the Congressional Research Service, the Office of Science and Technology — creates competition over numbers and advice that makes OMB less necessary to Congress, while greater dependence on ideology makes it less essential to presidents. I would add only that the monopoly of advice long considered an essential characteristic of bureaucracy has been irretrievably lost not only to these legislative institutions but also to policy experts in think tanks, consulting firms, universities and state houses, phalanxes so deep they create rival teams of analysts certain they can do better.

With Mosher having done so much so well, what does Walker have to offer? Plenty; only the bare outlines of GAO's story are the same. Where Mosher is historically and comparatively ambitious, Walker is a conceptual risk-taker. His theory is that to change policy you have to change the professionals in your organization, and to change their doctrine you have to alter

the cultural context in which they operate. Where Mosher (who, though at another university, served on Walker's doctoral committee) rolls resiliently with the punches, exuding a magisterial appreciation for the good that has been done, expecting less of imperfect institutions, Walker, coming from an army culture, takes a tougher stand. He uses his exemplary ethnography to explain how GAO was transformed and what the consequences for public policy have been.

Walker sees environmental pressures causing performance to fail, which leads to a new strategy and structure transforming the organizational culture, thereby altering its outputs. The great strength of his book is his ability to penetrate the inner life of GAO, from the rebukes it received to its painful but ultimately successful responses. Walker shows how "In turmoil, Staats found opportunity" (p. 61). Staats first created counter-elites to challenge the prior emphasis on process over purpose; then he deflected attention away from the audit as a mystery and toward auditing as a working tool of program evaluation. By serving Congress better, more often, Staats was able to beat back efforts by GAO's old-guard accountants to thwart the introduction of new professionals oriented toward policy analysis.

Just as the army produces plans for attack, the GAO produces reports for Congress. The dominant ethos is to be factual and critical: "Auditing is essentially adversarial" (p. 103). GAO audits and evaluates, in its own eyes, for efficiency. Walker is particularly effective in bringing out hitherto unsuspected consequences of this seemingly antiseptic approach.

While ostensibly promoting responsiveness, GAO's emphasis on uniform reporting often leads to more paperwork and rigidity. Preaching decentralization, GAO's requirements lead to more centralization. Though this is also unintended, Walker argues, "GAO's financial, management and program evaluations encourage growth in the size and scope of the state. The recurring deficiencies discovered in financial audits prompt calls for larger, more intrusive internal audit organizations and more extensive

cost-accounting systems" (p. 126). Walker concludes that while GAO reports were not used much by agencies and Congress to improve efficiency — agencies have more substantive agendas, Congress relies more on its staff, and GAO often cannot meet quick deadlines — "it has admirably served the political needs of the Congress" in coercing executive agencies. When legislators want more attention paid to their preferences, they call for GAO reports to back them up. Whether or not these reports are accurate, they expose the agency to criticism.

Here I think Walker neglects the subsurface understandings that promote cooperation among career civil servants interested in coming to an agreement on what it means to do a better job. The diffusion of state-of-the-art sampling techniques, evaluation methods, and standards of evidence is worthwhile. As a long-time user of GAO reports (where else can one get evidence on the beekeepers' entitlement, or the status of secret funds in defence?), GAO contributes to the existence of diverse and independent sources of policy analysis that, when evidence matters, does make a difference. If GAO is thought of as part of a stream of evaluations, it

does add its mite to public enlightenment.

An innovative section of Mosher's book (he calls it "microgeography" or the effect upon the organization and its constituents of the buildings in which it is housed) deserves brief attention. Where the division between the old (incredibly ornate) and the new (incredibly bleak) executive office buildings serves to deepen the division between career and political appointees, the GAO, after rejecting the magnificent Pension Building on grounds of economy, finally got into its concrete mausoleum only to discover that its changed missions had left it much too small to fill up the space. Organization and irony go together.

Anyone who thinks that these splendid books make further study of GAO unnecessary should think again. Placing its accounting function and functionaries against a background of the significance — cultural, political, programmatic, economic, organizational — of accounting categories would make a fascinating study. If accounting is how government knows itself, looking into this house of mirrors tells us that the first steps toward making government understand itself have hardly been taken.

## ACCOUNTING AND BUSINESS RESEARCH

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## INHERENT RISK: AN INVESTIGATION OF AUDITORS' JUDGMENTS\*

JANET L. COLBERT  
*Auburn University*

### Abstract

The assessment of inherent risk is a judgment required of auditors by Statement on Auditing Standards 47 (Auditing Standards Board, AICPA, New York, 1983) that normatively affects the scope of work performed on audit engagements. This study explores the judgments of auditors concerning inherent risk in inventory. Four inherent risk factors were examined: turnover of the controller, financing pressure, the amount of complexity of overhead in inventory, and the quality of the personnel responsible for the inventory calculation. A human information processing approach employing ANOVA was utilized to determine the relative reliance on these factors in the inherent risk judgments of 65 practicing auditors. Correlation techniques were used to measure consensus, reliability, and self-insight.

The results suggest that although all four inherent risk factors were important to auditors, quality of personnel was the most significant. Reliability was slightly lower than in previous research, but was still fairly high. Self-insight was moderate.

An exploratory study of inherent risk judgments by practicing auditors provides the basis for the present analysis. One objective of the research is to determine whether cues which are cited in the literature are actually relied upon by auditors in assessing inherent risk. In addition, consensus, reliability, and self-insight of auditor judgments are investigated.

With the issuance of Statement on Auditing Standards No. 47, "Audit Risk and Materiality in Conducting an Audit" (SAS 47, 1983), the notion of inherent risk has gained increased attention. Whilst previously auditors had only informally included inherent risk in their audit planning, the statement now requires them to consider quite explicitly this risk in planning their work in an audit area.

Inherent risk, along with internal control risk and detection risk, is a component of the total audit risk. It can be defined as the risk that an

account balance or class of transactions contains an error that could be material, when aggregated with errors in other balances or classes of transactions, assuming there are no related internal accounting controls.

In planning the level of substantive work on an engagement, the auditor is ultimately interested in detection risk. However, to appropriately set detection risk, other factors of audit risk must be evaluated. Auditors are accustomed to judging internal control risk. Assessing inherent risk is not as familiar a task, however. Also, as a footnote in SAS 39 points out, inherent risk may be "difficult and potentially costly to quantify." Despite the difficulties involved, the auditor must now consider this component of risk.

The inherent risk judgment may significantly influence both the efficiency and the effectiveness of an audit. Efficiency is affected if inherent risk is assessed at a higher level than appropriate

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and more audit work is performed than is essential. Conversely, if inherent risk is judged to be lower than appropriate, less substantive testing than necessary is done. An ineffective audit could result. It is therefore important for the auditor to assess inherent risk at its appropriate level.

### *Rationale for the study*

The present study represents an initial effort to gain a better understanding of how auditors judge inherent risk. The motivation for the study stems from several sources. First, although the concept of inherent risk has increased in significance, there is little knowledge of how auditors form inherent risk judgments. It is not known, for example, whether auditors' inherent risk assessments are linked empirically to actual errors in the accounts. The present research provides some preliminary insights into how practitioners assess inherent risk and how they utilize inherent risk cues in their decisions. Whilst factors have been suggested in the literature which should bear on inherent risk decisions, these prior studies have not examined which factors auditors actually incorporate into their judgments. The current work explores how auditors use four factors in assessing inherent risk.

The research also seeks to understand the effect of inherent risk on internal control. Libby *et al.*, (1985) have shown that assessments of internal control are dependent on the level of the susceptibility of the process to errors (inherent risk). If these risks are not independent as suggested by the audit risk model, then understanding the inherent risk judgment becomes of even greater significance.

Human information processing methodology was selected to investigate inherent risk judgments because it enables an investigation of the degree of reliance on particular items of information in the judgment process. In addition to analysing the significance of a number of different actions in the judgmental process, the auditors' consensus reliability and self-insight are also explored. Consensus has been found to be positively correlated to accuracy in accounting decision making. In situations in which the accu-

racy of the judgment cannot be determined, consensus serves as a substitute criterion (Libby, 1981). Reliability is of interest because one's faith in a judgment and in the judge is higher if the assessments are reliable. Finally, if a practitioner possesses self-insight, that person can pass on knowledge and aid in training inexperienced auditors.

### LITERATURE REVIEW

To date, the literature does not report on judgments of inherent risk. Brumfield *et al.*, (1983), Elliott (1983), and Warren (1979) limit discussion of inherent risk to the general concept and to suggestions of factors that might influence the inherent risk assessment. Inherent risk studies which take an empirical approach attempt to link factors in the client environment to the presence of errors. One such study, by Hylas & Ashton (1982), found that factors relating to personnel and cut-off problems led to 36% and 38% of the errors, respectively, on the 152 audits studied. In addition, as expected, errors were found to be related to the client's industry. Johnson's (1983) data revealed that as internal control became weaker, both the variation of clerical and staff errors and the size of the largest errors increased. Financing pressure was positively related to large overstatements. Finally, when the chief financial officer had not been with the client long and there was significant turnover, errors were likely to be large.

Willingham & Wright (1984) studied a large sample of inventory and accounts receivable errors. Their results show the difficulty involved in identifying inherent risk factors. Of 55 possible predictor variables, some showed significant positive correlations with errors, but many displayed low or even negative correlations. Also, error prediction models for inventory and accounts receivable had adjusted  $R^2$  of 0.39 (using five variables) and 0.32 (using four variables), respectively. In a study examining the relationship of environmental factors to error rates, Ham *et al.*, (1985) found the distributions of the errors in various accounting categories to

be significantly different. The error distributions of accounts receivable and accounts payable were affected by individual firm characteristics. Industry had a significant impact on the incidence of errors in purchases. Firm specific effects were found for the rate of error in accounts receivable, accounts payable and inventory. Except for errors in inventory, firm size did not have a significant effect on error rates. For inventory, the error rate decreased as the firm size increased. Rather than examining the existence of actual errors, Coakley & Loebbecke (1985) studied practicing auditors' expectations of errors occurring. The authors first analytically identified 106 potential sources of monetary errors. They then employed a Delphi technique and determined, for each potential source of error, the practitioners' estimates of the likelihoods of a material error arising from a single source and from related transactions. The study highlights several audit areas that display a high probability of material error and suggests that these areas deserve greater attention when evaluating internal control, or performing substantive tests.

To summarize, prior studies have shown that positively identifying inherent risk factors is a difficult task. Still, the literature suggests that the incidence of errors is positively associated with personnel problems, industry, cut-off problems, internal control, the complexity of the transactions, the length of time the chief financial officer has been with the firm, turnover of the chief financial officer, and financing pressures. Several of these factors are incorporated into this experiment.

#### THE RESEARCH EXPERIMENT

The present study examines the judgments of inherent risk made by practicing auditors using four of the inherent risk factors suggested in the literature. Being descriptive in nature the research does not attempt to test hypotheses generated from an existing theory involving inherent risk. Rather, the study uses an inductive approach; data regarding inherent risk assessments

are analyzed in an effort to gain an initial understanding of auditors' judgments in this significant new area.

#### *Experimental task*

Auditors began the experiment by reading a short discussion of risks in the audit process. The terms audit risk, inherent risk, control risk and detection risk were defined in accordance with SAS 47. Participants also received data on a hypothetical medium-sized metal manufacturing client. An industrial firm was used because the respondents would be likely to be familiar with this type of firm. Inventory amounts and aggregate balance sheet data, which indicated a stable but growing client, were provided for the current and previous years. Inventory comprised about one-half of the firm's total assets and thus would be deemed to be a material amount. Internal control in the inventory area in prior years was described as adequate. Auditors were to assume that their firm had examined the client for the past five years and that unqualified opinions had been issued. A copy of the instrument is available upon request.

After studying the background information, auditors judged the inherent risk in the inventory area for a number of cases. Inventory was utilized to explore inherent risk, since this account is an important audit area for an industrial firm. Hylas & Ashton (1982) found more errors (31.7%) in inventory and production costs for industrial companies than in any other category. Kinney (1979) also reported that a high percentage of the adjustments found for manufacturing firms were in inventory (68%) and cost of sales (77%).

#### *Cases and factors*

The participants were presented with a series of cases formed by four inherent risk factors that were dichotomously scaled. The levels of each factor were subjectively chosen in an attempt to represent high and low risk levels of that factor. The manner in which the levels were operationalized could affect the results, and this should be considered when interpreting the data. A full factorial experimental design was





used to develop 16 cases. The order of the cases was varied randomly from subject to subject.

Several criteria were considered in selecting inherent risk factors from among the many possible factors presented in the literature. First, factors were chosen from among those which have been empirically shown to affect inherent risk. Second, because SAS 47 stresses that some inherent risk factors bear on many or all audit areas but others are peculiar to a particular area, two pervasive factors (turnover of key financial personnel and financing pressure) and two factors affecting only inventory (overhead in the inventory calculation and the quality of personnel responsible for the inventory calculation) were selected. Finally, the ability to manipulate the factors at high and low levels for use in a case study was considered.

#### *Choice of cues*

Using the criteria presented above, four cues were chosen for use in the experiment. The manner in which each of the four factors was operationalized and the levels of the factors are explained in Appendix A. Turnover of key financial personnel may significantly affect inherent risk because a new financial officer may implement different policies and procedures, perhaps causing errors until personnel are familiar with the new system. Even if no changes are made, errors in judgment by the new financial officer may occur until the person becomes acquainted with the system. Brumfield *et al.*, (1983), Johnson (1983) and Willingham Wright (1984) all linked higher risk with high turnover in key financial personnel. The present study investigates whether auditors consider the rate of turnover of the chief financial officer in assessing inherent risk in inventory.

Another factor investigated is financing pressure. SAS 47 (1983) identifies lack of sufficient working capital as a factor that might be considered when assessing inherent risk. Also, three studies (Brumfield *et al.*, 1983; Willingham & Wright, 1984; Johnson, 1983) found an association between the existence of errors and financing pressure. This study explores whether financing pressure, a pervasive factor, is relied

upon by auditors in their assessments of inherent risk.

The third factor deals with the application of overhead in the inventory valuation. In some inventories, overhead may be an immaterial amount and be computed using simple formulas. For other clients, estimates of overhead may involve complex formulas and comprise a large portion of the ending inventory balance. Elliott (1983), SAS 47 (1983) and Coakley & Loebbecke (1985) suggest that complex calculations which aggregate to a substantial amount pose a higher risk than simple calculations totalling to a smaller figure. The current research examines whether auditors consider the amount and complexity of the overhead calculation when judging inherent risk.

The final factor examined in this work deals with the client personnel directly responsible for inventory calculations. Both Johnson (1983) and Willingham & Wright (1984) found that such factors as the rate of turnover, competence, due care, time pressures, and the knowledge and experience of accounting personnel are related to errors found in the inventory area.

#### *Participants*

Diverse groups of auditors were included to strengthen the external validity of the study. Two Big Eight firms (A and B), another large international firm (Group C), and members of a local chapter of a state CPA society (Group D) participated and provided 12, 23, 16 and 14 auditors respectively. The researcher administered the experiment to Groups A, B and C while they were attending (separate) inhouse seminars. Group D performed the research during a monthly meeting. The particular auditors included in the research were thus not randomly selected; rather, their selection was based on attendance at the seminars or the monthly meeting. The nonrandom nature of the participants may affect the generalizability of the results. The presence of the researcher at the sessions enhanced control over the experiment, i.e. it was verified that outside materials were not consulted, that participants did not discuss the task

as they were performing it, and that the auditors themselves actually completed the cases.

Demographic data from the auditors were gathered in the research instrument. Of the 65 auditors, 30 were seniors, 29 were managers and 6 were partners. Auditors at these levels of experience frequently make inherent risk assessments as part of their audit planning responsibilities. The mean level of experience was 6.2 years.

### *Judgment task*

After reading the discussion of risks in the audit process, studying the company background data and instructions, and assessing the factors for a case, auditors were asked to make inherent risk assessments on a nine-point scale. A total of 20 cases were assessed by each participant: 16 original cases plus four repeat cases. After using the nine-point scale to assess the inherent risk in each of the cases, the auditors distributed 100 points among the four inherent risk factors to reflect the relative importance of each factor in the judgment of inherent risk. An example of a case is given in Appendix B.

The task was administered by the researcher in a pilot study and then to each group of auditors for the experiment. The participants in the pilot study, six auditors from a national public accounting firm, indicated in their written comments that the research instrument was clear and readily understandable and that the study was realistic. The mean reported time to complete the 20 cases was 18 minutes. (Recall that the participants had previously been introduced to the factors in the background materials.)

## RESULTS

The analyses of the results are presented in the following order: (1) the importance of the inherent risk factors, (2) consensus, (3) reliability and (4) self-insight.

### *Importance of factors and combinations of factors*

The results of the ANOVA for the overall samples, shown in Table 1, indicate that while each

TABLE 1. ANOVA for overall sample

| Source    | Degrees of freedom | F-value | p-value |
|-----------|--------------------|---------|---------|
| <i>T</i>  | 1                  | 423.73  | 0.0001  |
| <i>F</i>  | 1                  | 388.74  | 0.0001  |
| <i>O</i>  | 1                  | 323.64  | 0.0001  |
| <i>Q</i>  | 1                  | 1175.12 | 0.0001  |
| <i>TF</i> | 1                  | 2.02    | 0.2934  |
| <i>TO</i> | 1                  | 0.04    | 0.8877  |
| <i>TQ</i> | 1                  | 3.07    | 0.1955  |
| <i>FO</i> | 1                  | 0.03    | 0.8935  |
| <i>FQ</i> | 1                  | 3.07    | 0.1955  |
| <i>OQ</i> | 1                  | 1.28    | 0.4030  |
| Error     | 1029               |         |         |
| Total     | 1039               |         |         |

#### Factor notation:

*T* is turnover of controller.

*F* is financing pressure.

*O* is overhead in inventory.

*Q* is quality of personnel responsible for the inventory calculation.

main effect is significant, no first order interactions are significant ( $p \leq 0.05$ ).<sup>1</sup> ANOVAs were also run for each participant. The percentage of main effects and interactions which were significant to the auditors are also shown in Table 2.

Table 2 indicates that factor *Q*, quality of personnel responsible for the inventory calculation, has the highest percentage of significance (89%) across auditors with all of the auditors in Group D finding factor *Q* to be important. This finding is very interesting because it stresses the importance of the human element in internal control across clients which vary widely in terms of the sophistication of systems and the technical expertise of employees.

The remaining three main effects are significant to at least 58% of the auditors. Table 1 shows that for some individual auditors, interactive effects prove significant. Only a small percentage (3–15%) of auditors, however, find any

<sup>1</sup> Since the results of the group ANOVAs are consistent with the overall ANOVA, the group ANOVAs are not shown.

TABLE 2. Significant effects and omega-squared statistics

|         | Percentage of individual respondents<br>finding effects significant<br>at the 0.05 level |          |          |          |              |           |           |           |           |           | Omega-squared statistics |          |          |          |              |
|---------|------------------------------------------------------------------------------------------|----------|----------|----------|--------------|-----------|-----------|-----------|-----------|-----------|--------------------------|----------|----------|----------|--------------|
|         | Factor                                                                                   |          |          |          | Interactions |           |           |           |           |           | Factor                   |          |          |          |              |
|         | <i>T</i>                                                                                 | <i>F</i> | <i>O</i> | <i>Q</i> | <i>TF</i>    | <i>TO</i> | <i>TQ</i> | <i>FO</i> | <i>FQ</i> | <i>OQ</i> | <i>T</i>                 | <i>F</i> | <i>O</i> | <i>Q</i> | <i>Total</i> |
| Group A | 83                                                                                       | 83       | 75       | 92       | 8            | 17        | 1         | 17        | 25        | -         | 12                       | 12       | 13       | 32       | 69           |
| Group B | 70                                                                                       | 57       | 70       | 83       | 4            | 4         | 13        | 4         | 9         | 4         | 13                       | 10       | 10       | 23       | 56           |
| Group C | 56                                                                                       | 56       | 56       | 88       | 13           | -         | 19        | 13        | 6         | -         | 10                       | 10       | 7        | 28       | 55           |
| Group D | 50                                                                                       | 43       | 64       | 100      | 14           | 14        | 14        | 7         | 7         | 7         | 5                        | 6        | 3        | 34       | 48           |
| Overall | 65                                                                                       | 58       | 66       | 89       | 9            | 8         | 15        | 9         | 11        | 3         | 10                       | 9        | 8        | 28       | 55           |

Factor notation:

*T* is turnover of controller.

*F* is financing pressure.

*O* is overhead in inventory.

*Q* is quality of personnel responsible for the inventory calculation.

Note. Decimals are omitted from the table.

single interaction significant.

The relative importance of each significant factor and first-order interaction was evaluated through the use of omega-squared statistics. The omega-squared statistic was computed for each factor and first order interaction for (1) the overall sample, (2) each group and (3) each auditor.

The omega-squared statistics for the overall sample and for the groups are also presented in Table 2. The statistics indicate that, overall, 55% of the variance can be explained by the main effects. The first-order interactions do not add to the explanatory power; thus, the total variance explained is also 55%. At the group level, 48% (Group D) to 69% (Group A) of the judgment variance can be accounted for by the main effects. Factor *Q* accounts for two to six times more of the variance than the factor with the next highest omega-squared; this is consistent with the earlier findings in the table.

Omega-squared data for individual auditors indicate that 27% to 99% of the variance in the judgments is explained by the main and first-order interactive effects. Averaged over the entire sample, 77% of the individual decision variance is explained: 74% by main effects and 3% by interactions. The omega-squared statistics for the individuals averaged across groups reveal

that the main and first-order interactions accounted for (1) 83% of Group A's judgment variance, (2) 76% of Group B's, (3) 73% of Group C's and (4) 77% of Group D's. By itself, factor *Q* accounts for 34% of the variance of the total sample, whereas each of the remaining three factors explains 13–15% of the variance. The small explanatory power of the interactions and the importance of factor *Q* for individual auditors is consistent with the data presented in the table.

In summary, the analyses suggest that each of the four inherent risk factors utilized in this study and suggested in the literature significantly influences auditors' judgments of inherent risk. While differences exist among individual auditors as to how much of the judgment variance is explained by the four inherent risk factors, the predominant cue patterns are consistent. The quality of personnel responsible for the inventory calculation, factor *Q*, is weighted more heavily than any of the other factors. This finding is reasonable in light of the importance attached to personnel in auditing practice and in the literature. The turnover of the controller, financing pressure, and overhead in inventory factors are weighted about the same, and interactive effects of the inherent risk factors account for a minimal proportion of the variance in the judgments.

### *Consensus*

The second objective of the research was to investigate the consensus of the auditors in assessing inherent risk. Two types of consensus are examined: within-group consensus and between-group consensus.

The correlations for within-group consensus were computed for all possible pairs of auditors within a group and averaged. Kendall's coefficient of concordance (Siegel, 1956) was also used to measure the association within groups.

The average pairwise Pearson correlations ranged from 0.61 to 0.74 for the four groups. The average was 0.64. The coefficients of concordance were all significant at the 0.0001 level. All correlations were highly significant as computed by a Fisher Z transformation. Auditors in Group A reached somewhat higher consensus than the other groups. Upon inquiry and review of firm manuals, it was found that Group A uses a more structured audit approach that explicitly includes consideration of environmental factors in planning the audit. The inherent risk factors studied here parallel some of the environmental factors considered by that firm. The remaining groups had not incorporated inherent risk into their audit approaches. It seems reasonable to believe that the structured approach used by Group A led to the higher level of consensus.

Between-group consensus measures ranged from 0.61 to 0.72 and again all correlations were significant. Comparison of the within-group and between-group consensus data indicates that the two types of consensus measures do not vary much from group to group. Two possible explanations are offered for the surprisingly high level of agreement of the auditors in the study.

First, consensus may arise because of a common body of professional knowledge. That is, perhaps all auditors receive a common core of education and training before arriving at the staff level at which decisions on inherent risk are made.

A second explanation for the high level of consensus involves consideration of the four inherent risk factors: turnover of the controller, financing pressure, overhead in inventory, and the quality of personnel. These four factors have

been suggested in the literature as affecting inherent risk. However, few factors bear exclusively on one type of risk. For example, because financing pressure on the client may cause concern to users of the financial statements as well as contribute to errors in the accounting process, that factor may influence business risk and the risk of loss or injury to the public accounting firm, as well as inherent risk. (See Brumfield *et al.*, 1983, for a discussion of business risk.) The turnover of the controller, overhead in inventory, and the quality of personnel may affect both internal control risk and inherent risk. Thus, auditors may already be familiar with considering the four inherent risk factors when evaluating internal control or business risk.

### *Reliability*

Assessing the reliability of auditors' judgments was the third objective of the study. The auditors' four repeat assessments were correlated with the original judgments to measure test-retest reliability. The Pearson and Spearman correlations computed for individuals displayed a wide range of indices. The reliability correlations for the four groups ranged from 0.62 to 0.81 and averaged 0.73 for the entire sample. Out of 65 auditors, three had negative correlations. However, most auditors displayed reasonably reliable behavior with several exhibiting perfect reliability scores of 1.00. Group A showed a higher level of reliability than the other groups. Their structured firm approach, as discussed, may explain this finding.

### *Self-insight*

The self-insight indices, computed by correlating the 100 point scale subjective weights and the omega-squared statistics, were 0.60 (Pearson) and 0.61 (Spearman) averaged across the entire sample. Averages across Groups A–D ranged from 0.58 to 0.65 (Pearson) and from 0.52 to 0.68 (Spearman). The Fisher Z transformations were significant at  $p = 0.0027$  or below for all groups and overall. Auditors in the four groups displayed about the same level of understanding regarding their inherent risk judgments.

## DISCUSSION AND LIMITATIONS

The results suggest that auditors find the turnover of the controller, financing pressure, overhead in inventory, and particularly the quality of personnel important in inherent risk judgments regarding the inventory section of the audit. The participants in this study used factors which the professional literature both suggests should be considered in assessing inherent risk, and shows to be related to errors. It is encouraging that the auditors employed factors in their inherent risk judgments that have been linked empirically to errors in the accounts. The level of consensus found in this study is comparable to results of prior research of internal control evaluations but higher than findings in other accounting studies. Both the reliability and self-insight measures are slightly lower than those in earlier accounting studies [see Libby (1981) and Ashton (1982) for comprehensive reviews of consensus, reliability and self-insight results in accounting studies]. These findings might be explained by considering the nature of the task. The factors the auditors used in assessing inherent risk are familiar; they may have used those cues in judging other types of risk. Still, inherent risk is a relatively new concept that auditors have not dealt with extensively. Thus, the subjects were able to achieve good consensus, but were not knowledgeable enough about their own decision processes to display high reliability and self-insight.

The findings of this study are important in light of the requirement of SAS 47 that auditors consider inherent risk in planning the audit work in an area. In order for the inherent risk judgment to help the practitioner perform an efficient, effective audit, the assessment must be appropriate. The finding that auditors can use factors associated with actual errors to assess inherent risk, combined with the high consensus, gives credence to the idea that auditors are making appropriate judgments. The reliability and self-insight indices showed that practitioners made consistent decisions across time and understood the reliance of factors in the judgment process.

Although these results are encouraging, con-

cern with the SAS 47 requirement arises when data on the groups and the individual auditors are examined. One group, a Big Eight firm, displayed higher consensus and reliability than the other groups. Also, a larger percent of their judgment variance was explained. The firm's structured approach to audits may explain these results. Future research should further explore whether greater structure improves inherent risk decisions [see Cushing & Loebbecke (1984) for a discussion of the implications of structured methodologies].

At the individual level, differences appear in cue reliance, in reliability, and in self-insight levels. These differences suggest that when auditors evaluate detection risk, after considering audit risk, inherent risk, and control risk, each may arrive at a different assessment. Thus, in a given situation, varying levels of audit work could be performed. For some auditors, an inefficient audit would result. Of greater interest than an inefficient audit is the possibility that as a result of assessing inherent risk lower than its "actual" value, an auditor could perform an ineffective audit.

Concern with the individual differences reported here may be alleviated when one considers that the inherent risk assessment and the planned audit program are reviewed by superiors before implementation of the audit work and that the review may cause some of the differences at the individual level to diminish. Still, auditors' judgments of inherent risk in inventory could be improved, and the present research is an initial step in understanding and evaluating these risk judgments.

### *Limitations*

The limitations of the study should be taken into account when interpreting the results. First, the participating auditors completed a well-structured task. Typically, practitioners have much more data available regarding a client than the background information provided in this research. Another possible concern lies in the levels chosen for the factors. Care was taken to operationalize high and low levels for each factor. Nonetheless, different choices for the levels

could change the results. Analysis of inherent risk judgments when the cues are operationalized in a different manner is an avenue for future research.

Besides the levels of the factors, the factors themselves may be a limitation. It is desirable, for the sake of internal validity, to select factors for study which bear only on inherent risk. However, virtually all factors affecting inherent risk may also influence control risk or business risk. Haskins' (1986) research suggests this: he found control environment cues to be equally relevant to internal control and inherent risk assessments. Thus, the results obtained here may arise because auditors are familiar with using the factors in other risk assessments. To lessen the possible confounding of the results, the researchers repeatedly emphasized, in the instructions and verbally, that the task involved judging inherent risk.

The interval scale used to judge inherent risk may also represent a limitation of the research. Despite explanation in the instructions, an example case, and notations providing semantic guidelines on each case, the auditors may not have interpreted the points on the scale identically. Also, the equal interval assumption may not have been met. These concerns are alleviated by considering the results of research into scaling techniques. Little difference has been found between analyses based on interval (metric intervals) or those based on nonmetric intervals.<sup>2</sup>

Finally, a possible limitation of the research is

that factors which are suggested in the literature as bearing on inherent risk, and possibly used by auditors in their judgments, may not actually be related to the presence of errors. In a study investigating 54 inherent risk factors, Willingham & Wright (1984) found many were not significantly associated with errors. However, Johnson (1983) and Hylas & Ashton (1982) were able to find relationships between errors and inherent risk factors. Further research is needed to reconcile these results.

## CONCLUSION

This exploratory research has provided insights into how practitioners assess inherent risk. Auditors' judgments of the concept are critical because (1) inherent risk is a significant component of the audit risk model and (2) control risk, another important variable in the model, is a function of the level of inherent risk. Thus, the assessment of inherent risk bears directly on the amount, timing and extent of audit procedures and on both the efficiency and the effectiveness of the audit. Previous works have only suggested factors that should affect inherent risk and have not explored auditors' actual judgments. This study examined practitioners' assessments by determining the significance of the inherent risk factors, and by exploring consensus, reliability and self-insight. The issues studied here may help practitioners and researchers understand inherent risk better and lead to improved inherent risk judgments.

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## APPENDIX A FACTOR LEVELS

### *Turnover of controller*

1. There has been one controller in the last ten years. The present controller has been in the position for ten years.
2. There have been four controllers in the last ten years. The present controller has been in the position for six months.

### *Financing pressure*

1. Fixed commitments for the next several years will be about the same as in the past. The projected amounts of working capital from operations will be adequate to cover the fixed commitments.

**Overhead in inventory**

1. The inventory is comprised of materials, labor, and a small amount of overhead. The overhead is applied through the use of a simple formula.
2. The inventory is comprised of materials, labor, and a large amount of overhead. The overhead is applied through the use of a complex formula.

1. The personnel directly responsible for the calculation of the inventory valuation have training in accounting. They are experienced in the work, and are not under time pressure to complete the task.

2. The personnel directly responsible for the calculation of the inventory valuation do not have training in accounting. They are not experienced in the work, and are under time pressure to complete the task.

## APPENDIX B. EXAMPLE OF CASE

|                                                                                                                                                                                                                      | Inherent risk: | Low   | Medium | High  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------|--------|-------|
|                                                                                                                                                                                                                      |                | 1 2 3 | 4 5 6  | 7 8 9 |
| Turnover of controller                                                                                                                                                                                               |                |       |        |       |
| There <i>has been one controller</i> in the last 10 years. The present controller has been in the position <i>10 years</i> .                                                                                         |                |       |        |       |
| Financing pressure                                                                                                                                                                                                   |                |       |        |       |
| Fixed commitments for the next several years will be <i>bigger</i> than in the past. The projected amounts of working capital from operations <i>may not</i> be adequate to cover fixed commitments.                 |                |       |        |       |
| Overheads in inventory                                                                                                                                                                                               |                |       |        |       |
| The inventory is comprised of materials, labor, and a <i>small</i> amount of overhead. The overhead is applied through the use of a <i>simple</i> formula.                                                           |                |       |        |       |
| Quality of personnel responsible for inventory calculation                                                                                                                                                           |                |       |        |       |
| The personnel directly responsible for the calculation of the inventory valuation <i>have</i> training in accounting. They are experienced in the work, and <i>are not</i> under time pressure to complete the task. |                |       |        |       |



## THE IMPACT OF CURRENT-VALUED DATA ON THE PREDICTIVE JUDGMENTS OF INVESTORS\*

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### Abstract

This research employed a human information processing experiment to study the impact of replacement cost (RC) on the predictive judgments of investors. Sophisticated and unsophisticated investors were provided with either historic cost (HC) or both HC and RC data and were asked to predict the share price performance of chemical and drug stocks. The RC data were associated with lower accuracy and consensus among those who were relatively high users of it as determined by their response models.

Traditional historic cost (HC) accounting statements have been criticized for failing to provide information that is sensitive to inflationary effects (Davidson & Weil, 1975, p. 27). Replacement cost (RC) accounting, one of many forms of inflation-accounting, is purported to consider inflation because RC depreciation allowances are more current than HC allowances.<sup>1</sup> Some researchers argue that RC net income is the most useful accounting number for those concerned with dividend paying ability because this number represents a dividend distribution that can be sustained without impairing productive capacity, see for example, Falkenstein & Weil

(1977), Vancil & Weil (1976), and Davidson & Weil (1976).

Because it is purported to improve financial reporting during periods of changing price levels, RC accounting has prompted much interest in its impact on investors. The availability of any new financial statement data (1) offers investors cues whose usage may influence judgmental performance and (2) increases the number of cues available to investors for processing. The purpose of this study is to examine the extent to which these factors influence the judgments of sophisticated and unsophisticated investors within the context of a predictive task

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<sup>1</sup> In the present study, RC information is that required by Accounting Series Release No. 190 (ASR 190), the first publicly available inflation-accounting data in the U.S.A. The Securities and Exchange Commission (SEC) promulgated ASR 190 (23 March, 1976) which required all registered firms having inventories, gross property, plant and equipment which aggregate more than \$100 million and comprise more than 10% of total assets to disclose, in RC terms, for fiscal years ending after 25 December 1976 the following data: inventories, productive capacity (gross and net of accumulated depreciation), cost of goods sold and depreciation expense. Required current-value disclosures for fiscal years ending after 25 December 1980 are governed by Financial Accounting Standard Board (FASB), Statement No. 33 (FAS 33). The FASB statement differs from the SEC's requirements. For example, the focus of FAS 33 is on current cost and constant dollars necessary to replace service potential presently owned, whereas ASR 190 focuses on the cost necessary to replace existing productive capacity. What is relevant is that both approaches are attempts to communicate publicly the effects of inflation on business entities.

experiment. Specifically examined were the quality of predictive-judgments using accuracy and consensus measures. Accuracy is the degree to which predictive-judgments correspond with actual results, while consensus is the extent to which predictive-judgments agree across various subject groups.

Sophisticated and unsophisticated investors were randomly assigned to either a treatment group which received both HC and RC based financial cues, or a control group which received only HC cues. The investors were asked to predict the one-year percentage price change for 40 firms from the chemical and drug industries. Linear response models were used to measure the relative RC usage of the investors assigned to the treatment group. The role of RC data is to represent an increase in information load, and a potential source of information to be used in making predictive-judgments. The theoretical underpinnings of the present study are grounded in the human information processing literature, the empirical findings should add to the many "building blocks" which make up this body of knowledge.

The remainder of this paper is segmented into five sections. The Background section discusses other empirical studies of RC disclosures, and the experimental expectations as drawn from the behavioral literature. The Method section provides the details of the design and setting of the experiment. The Results section presents the empirical findings. The Discussion section relates the results to topics covered in the Background section. Finally, the Conclusion section consists of a general summary and some final comments.

## BACKGROUND

### *Other inflation-accounting studies*

Since inflation-accounting data have been publicly reported, most related empirical studies have been either comparisons of RC and HC accounting measurements (see Bates & Reckers, 1979; Davidson *et al.*, 1979; Woo & Seth, 1978), or examinations of the impact of RC data

on securities markets (see Gheyara & Boatsman, 1980; Beaver *et al.*, 1980; Ro, 1980). Evidence generated by these market studies suggests that no statistically significant security price or trading reactions were associated with the disclosure of RC information. According to Watts & Zimmerman (1980, p. 104), three explanations (other than methodological effects) were offered for such findings: (1) RC data disclosed in annual reports are irrelevant because information concerning inflation is processed by the market from a more timely source, (2) information contained in RC data is too general to cause changes in the share prices of specific firms, and (3) market participants ignored RC data because they were recent and unfamiliar. Beaver *et al.* (1982) used two-stage regressions to examine the incremental information content of RC numbers and concluded that RC earnings have no information content other than that contained in HC earnings.

Matolcsy (1984) and Schaefer (1984), in their respective market studies, also could not consistently find significant marginal information content in inflation-accounting data. Schaefer (1984) did observe incremental information in current value income of firms that paid high dividends, but time-series and cross-sectional factors rendered this finding tenuous. Freeman (1983) showed that security returns and current cost data are correlated but that accounting reports may not be the best source for current value data. Freeman (1983) also argued that even if current value data did have information content, such would be difficult to detect in conventional market studies because HC and current value earnings trends are dependent and the market anticipates current value income to a greater degree relative to HC income. In short, these market studies suggest that any apprehensions concerning shareholder reactions to inflation-accounting data are unfounded.

Market studies are not the only paradigm within which to study inflation-accounting information. Such studies focus on the behavior of market participants in aggregate, and are not necessarily extendable to individuals. The finding that the market in aggregate did not use or

benefit from RC data does not mean that RC information was used by no one. Also, market studies provide no insight on how those who did use RC data behaved. Scheiner & Morse (1979) stress the need to investigate the impact of RC data on the behavior of individuals. This lack of behavioral research was also noted by Vasarhelyi & Pearson (1979) who surveyed more than 500 sources involving inflation-accounting. According to these authors: "... unfortunately, in-depth analyses of field situations, user perception of value data, and experimentation with firms are not widely available in the literature." The lack of behavioral studies of RC disclosures is addressed in the present study in that it employs a human information processing paradigm to examine the impact of RC cues on the predictive judgments of sophisticated and unsophisticated investors.

#### *Behavioral literature*

General purpose financial statements are considered by some to provide information for nonexpert as well as expert investors, see AICPA (1970), Miller (1972), Sommer (1974), and Scott (1978). Therefore, both classes of individuals were included in the present study, and this literature review covers decision-making differences that distinguish experts from others. Furthermore, providing RC data to supplement HC data is an increase in information load; thus, the discussion also addresses the role of information load in decision-making. Experimental expectations are drawn from the literature review and relate to the interface between subject sophistication and information load within the context of the present empirical work.

*Sophistication level.* The notion that decision-making characteristics of experts and nonexperts differ receives strong support throughout the literature. Empirical research has shown that characteristics such as education, experience, and expertise which are embodied in sophistication level are the few personal attributes to have consistently influenced investor behavior (Snowball, 1980; Slovic, 1972; Lusk, 1973; Wright, 1977; Taylor, 1975). Indeed,

attributes such as personality, biographics, decision and cognitive style have not been useful in describing, understanding or explaining differences in human information processing (Sarason *et al.*, 1975; Savich, 1977; McGhee *et al.*, 1978; Dyckman *et al.*, 1982; Otley & Dias, 1982).

According to Einhorn (1976), experts are able to bring to mind a large set of cues from observing a small set of cues. Experts are able to compartmentalize their long term memory into systematic cue configurations that are prototypical of linkages among evidence, outcomes, problems and solutions. Thus, when making judgments, experts can recognize meaningful relationships to which they have been previously exposed by drawing on a large complex associative memory. Novices are much less able to evoke such causal models between cues and events to use as decision-making aids, see Libby (1981, pp. 78-95).

Bouwman (1984) used protocol analysis to construct profiles of the decision-making behavior of experts and novices in the context of a financial judgment task. Experts use a complex sequencing of processes, regularly summarize clusters of related observations, and use "rules of thumb" to test hypotheses against structured lists of typical problems. Novices use an inductive decision-making strategy whereby they process information in a repetitive sequential manner. In addition, novices ignore, while experts focus on potential contradictions as a means to hone in on underlying problems. Furthermore, according to Wright (1977) and Snowball (1980), sophisticated subjects because of their expertise and experience are more likely to possess a greater comprehension of the natural distribution of relevant distal variables than are unsophisticated subjects. Sophisticated subjects are thus expected to have an advantage in selecting and executing heuristics with which to approach judgmental tasks.

The advantages attributable to expertise suggest that sophisticated subjects should outperform unsophisticated subjects regarding accuracy and consensus — two frequently cited measures of the quality of predictive-judgments (see Ashton, 1982; Libby, 1981; Shields, 1983).

However, lower consensus was reported by Slovic (1972), Abdel-khalik (1974) and Snowball (1980) who used experienced stockbrokers, bankers and accountants respectively as sophisticated subjects. The explanations offered for such unexpected findings is that the unsophisticated subjects who were predominantly students were a more homogeneous group regarding prior experiences than were the sophisticated subjects. The former were more likely influenced by the analytical techniques and contrived data contained in instructional materials which typically are not as varied as those encountered in the "real world". In contrast, the sophisticated subjects were more removed from the constrained setting of the classroom. This confounding factor was avoided in the present study by using actual investors for both sophisticated and unsophisticated subjects.

The following hypotheses related to the sophistication issue as discussed in this section are tested in the present study:

(1)  $H_0$ . Investor sophistication has no effect on accuracy and consensus.

$H_a$ . The predictive judgments of sophisticated investors have greater accuracy and consensus than those of unsophisticated investors.

**Information load.** The behavioral literature is varied regarding the manner in which individuals cope with information load which can take several forms; e.g. an expanded cue set, an increase in alternative choices, greater complexity, an unfamiliar cue set, and time constraints. In the present study, information load took the form of the dual data set received by the treatment group subjects, one set of cues were computed using conventional HC numbers, the other set using less familiar RC numbers.<sup>2</sup>

Slovic (1966) and Hoffman (1968) noted two behavioral patterns that subjects used to cope with dual cue sets. Typically, subjects would either (1) process the average of the cues, or (2) process only one set of cues while ignoring others. Slovic & MacPhillamy (1974) noted a tendency for subjects to discount uncommon

cues. Because RC cues are less common than HC cues, RC cue usage was measured in the present study to identify those subjects that were less likely to have ignored the RC data, and thus were influenced by RC usage as well as by information load.

In addition to ignoring cues, other cognitive simplification devices used to manage information load are the use of heuristics, and reliance on internalized experience (Bruner, 1957). According to Payne (1976), such simplifying heuristics are likely to involve the substitution of noncompensatory for compensatory or additive decision models. In other words, instead of intuitively summing the perceived weights for each cue, decision-makers focus on whether or not a few salient cues have each met a minimum standard, see Einhorn (1971). However, the use of noncompensatory models to reduce cognitive strain is more associated with an expansion of choice alternatives than with an expansion of the number of cues (Payne, 1976).

The impact of information load and the associated cognitive simplification mechanisms on accuracy and consensus as indicators of decision-quality has been mixed (Slovic & Lichtenstein, 1971, pp. 685-688). The majority of studies, however, suggest that the effects of increasing the amount of information are to decrease accuracy and consensus (see, for example, Hayes, 1964; Einhorn, 1971; Jacoby *et al.*, 1974; Nystedt, 1974).

Shock effects were offered to explain the negative association between dual data sets and decision-quality in studies where inflation-accounting data were involved in the expanded cue set. McIntyre (1973), who conducted an experiment using actual firms and simulated current-value data, asked students to select one firm from several pair sets they felt would achieve the higher holding period return. The shock element was offered to explain why students receiving current-value data did not outperform students receiving HC data. Heintz (1973) provided students with either conventional, price-

<sup>2</sup> Responses to the debriefing questionnaire indicated that the investors did in fact have greater familiarity with HC data than with RC data; also, the latter were less familiar to the unsophisticated investors than to the sophisticated investors.

level restated or both conventional and restated financial statements with which to make stock purchase decisions. No differences were noted in decisions between subjects receiving conventional statements and subjects receiving restated statements. However, significant differences were observed between those subjects receiving both types of statements and those subjects in each of the other two groups. Heintz attributed this result to the shock effect of attempting to cope with two sets of financial statements, one of which was new and unfamiliar.

The negative association between information load and decision-quality is not found in all studies. In contrast, some studies involving the aggregation of accounting data have reported a positive relationship between accuracy and the quantity of information supplied (see Abdelkhalik, 1973; Barefield, 1972). According to the findings of Huff & Friedman (1967) an increase in cue set size is associated with greater consensus as an indicator of decision-quality if the additional cues are perceived to disclose incremental information that is relevant to the task, otherwise the information load factor results in lower consensus.

A similar contingency relationship between information load and decision-quality is suggested by Einhorn (1971), Casey (1980) and Wood (1986). These researchers argue that as information load increases, the decision-maker is challenged and performance initially increases; however, continued increases in load tax the information processing capabilities of the decision-maker to the point of overload, and decision-quality declines. For example, in a study of manufacturing executives making diagnostic judgments based on managerial accounting information, Shields (1983) observed accuracy and number of performance parameters (cues) to be positively related when only three responsibility units were evaluated, but negatively related when nine such units were evaluated. In short, the negative relationship between decision-quality and information load is contingent on factors such as the information processing threshold of the decision-makers. According to Snowball (1980), the impact of an ad-

ditional cue set on consensus is likely a function of the similarities among subjects regarding (1) the heuristics employed, (2) internalized prior experiences, and (3) the perceived marginal relevance of the additional cues to the experimental task.

The information-load discussion suggests several hypotheses that are tested in the present empirical work. These hypotheses are grounded in the expectation that the additional cues will be associated with lower decision-quality unless they are perceived to contain incremental information.

(2)  $H_0$ . The data sets have no effect on accuracy and consensus.

$H_a$ . Subjects receiving the single data set exhibit greater accuracy and consensus than subjects receiving the dual data set.

The next set of hypotheses are grounded in expectations based upon the findings of the market studies that RC data contains no incremental information.

(3)  $H_0$ . RC usage has no effect on accuracy and consensus.

$H_a$ . Low RC users exhibit greater accuracy and consensus than high RC users.

*Subject sophistication and information load.* The influence of subject sophistication and information load on response behavior was addressed in experiments by Wright (1977, 1979) and Dickhaut (1973). Wright (1977) had 39 second year MBA students make predictions for 60 stocks in the same industry based upon seven cues which were collapsed into five cues in the analysis. In the follow-up study, 35 first and 12 second year MBA students were provided four cues to evaluate 50 stocks (Wright, 1979). Wright used the achievement score ( $r_a$ ) to measure accuracy which for each subject was the correlation between the predicted and actual one-year percentage price change for each stock. Two aspects of Wright's findings are particularly germane to the present study, (1) the more advanced second year students were more accurate than the first year students, and (2) the second year students in the 1979 study that had only four cues, were more accurate than those in the 1977 study that had seven cues. These find-

ings suggest that sophistication level is positively related to accuracy while information load may be negatively related to accuracy.

Dickhaut (1973) provided businessmen and students with single (HC data) and dual (HC and current value data) information systems and asked them to estimate probabilities associated with stock price changes. Subject-performance was measured by the average absolute value of the difference between Bayesian and subjective probability estimates. Businessmen outperformed students in both the single and dual information settings, and both subject types performed better in the single setting. However, the superiority of the businessmen over the students was more pronounced in the dual setting.

In the present study, sophisticated investors were expected to be superior to unsophisticated investors in accuracy and consensus because the former were likely to have the advantages of (1) being able to draw on cue relationships stored in long term memory, (2) having greater knowledge of the natural distribution of the distal variable, and (3) having more rigorous information processing strategies. These advantages were also expected to provide the sophisticated investors with a higher threshold to the adverse effects of information load. Thus, in accordance with the findings of Dickhaut (1973), the anticipated superior predictive-judgments of the sophisticated investors were expected to be amplified within the treatment group.

Differences in predictive-judgments of treatment relative to control subjects can be attributable to RC usage and information load. Linear response models were used to identify those investors that were likely influenced by their RC usage in addition to being influenced by the information load effects of coping with a dual instead of a single data set. The impact of RC usage on decision-quality is an empirical question, no established theory addressing this issue exists in the behavioral literature from which explicit expectations can be drawn.

The following hypotheses are derived from the discussion on the interrelationships among subject sophistication, information load, and RC usage:

(4)  $H_D$ . The interaction between investor sophistication and the data sets has no effect on accuracy and consensus.

$H_A$ . The interaction between investor sophistication and the cue sets does affect accuracy and consensus. Specifically, the superior accuracy and consensus expected for sophisticated subjects over unsophisticated subjects is greater for those subjects receiving the dual cue set than for those receiving the single cue set.

(5)  $H_D$ . The interaction between investor sophistication and RC usage has no effect on accuracy and consensus.

$H_A$ . The interaction between investor sophistication and RC usage does affect accuracy and consensus.

## METHOD

### *General description*

In this research 44 sophisticated and 44 unsophisticated investors were provided financial ratios for 20 chemical and 20 drug firms and were asked to predict the one-year percentage price change for each firm's common stock.

An important aspect in the design of a human information processing experiment is the selection of an experimental task and cue variables that are familiar to the subjects, easily understood, and convenient to work with. Share price change was chosen as the distal variable because share prices are given more attention by the financial media than other possible dependent variables such as holding period return, beta, or cash flow per share; hence, share prices are more likely to be familiar to unsophisticated as well as sophisticated investors.<sup>3</sup>

Financial ratios were selected as the cue format to provide HC and RC information. Ratio analysis, only one of many common stock analysis procedures, was selected because this technique allows the presentation of data in compact profiles to prevent exasperation in a repetitive trial experiment. Ratios have the quality of being parsimonious in that much of the salient infor-

<sup>3</sup> Price change as the prediction variable does not require subjects to make explicit predictions concerning dividend policy. Firm-specific and median industry dividend payout ratios were provided in the cue sets and background information respectively. Thus, an implicit assumption is the expectation of stable dividend policies among the chemical and drug firms.

mation provided by an entire set of accounting statements may be summarized by a small group of numbers (Elam, 1975, p. 25).

#### *The research instrument and data set*

Part I of the two part instrument included directions and background information on the economy and the chemical and drug industries; part II consisted of a booklet which included the data profiles for each firm, upon which the subjects made their price change predictions.<sup>4</sup> Figure 1 shows a sample profile received by the treatment group. Each booklet had the profiles arranged in a different random order within each industry class; one profile per page.

|                                 | Conventional<br>historic cost<br>based | Replacement<br>cost based |
|---------------------------------|----------------------------------------|---------------------------|
| Earnings per share              | 3.08                                   | 2.42                      |
| Dividend payout ratio           | 0.39                                   | 0.50                      |
| Earnings price ratio            | 0.09                                   | 0.07                      |
| Return on assets                | 0.23                                   | 0.18                      |
| Growth in earnings<br>per share | 0.13                                   | 0.07                      |

Fig. 1. A sample firm profile observed by treatment group subjects.

To provide the subjects with independent variables that were realistic and understandable, an effort was made to select ratios which were (1) well known to the investment community, (2) used to evaluate common stocks, (3) measurable in RC terms, and (4) minimally correlated with but not necessarily orthogonal to each other. A combination of a literature search, an informal expert opinion survey, factor analysis, and correlation analyses using the chemical and drug firms as cases were used to select the following ratios as cues:

- (1) Earnings per share.
- (2) Dividend payout.
- (3) Earnings price.
- (4) Return on assets.
- (5) Growth in EPS.

The firms chosen as case observations were 40 calendar year chemical and drug firms that were subject to ASR 190. These industries were chosen because they are (1) capital intensive, and hence have HC earnings numbers that are potentially overstated as the result of inflation,<sup>5</sup> (2) well known and written of frequently in the financial press, and (3) have a substantial number of large firms subject to ASR 190. If an industry has too few large firms, subjects might easily guess the identity of the firms. In that case, the firms' image would be a confounding factor in the subjects' responses. In addition, using many industries with a few firms from each would require the presentation of background data and median ratios for each industry, resulting in an unwieldy instrument. Thus, the role of the industries is to provide a set of cases whose financial reporting is impacted by inflation and that are amenable to a repetitive trial experiment. The manner in which industry and firm effects on accuracy and consensus are addressed and controlled for, is discussed in the analysis section of this paper.

#### *Selection and classification of subjects*

The subjects were a convenience sample selected from actual sophisticated and unsophisticated investors in the Washington, DC area and were administered the experimental task in person over a 30 day period. Sophisticated investors were defined as those who earn their living by making investment decisions — stock brokers, financial analysts, fund and trust managers. Un-

<sup>4</sup> The background information was taken from the financial press for the first quarter of 1979. The cue set was compiled from financial statements for the year ended 31 December 1978. The subjects were asked to predict stock price changes for the period from 1 April 1979 to 1 April 1980. The actual dates were not disclosed.

<sup>5</sup> Because the inflation-accounting data was that disclosed in compliance with ASR 190 (see footnote 1), RC and HC net income differed only with respect to cost of goods sold and depreciation; thus, holding and purchasing power gains and losses were not included in RC net income which is very similar to "sustainable income" (Easman *et al.*, 1979) and "current cost income from continuing operations" (FASB, 1979). In almost all cases during periods of rising prices RC net income will be greater than respective HC net income. Furthermore, the median ratios for the respective industries that were provided as background information reflected systematically lower RC earnings numbers.

sophisticated investors were defined as those who do not earn a living by making investment decisions but who have at least on occasion used accounting information to make the decision to either buy, sell or hold common stock. The unsophisticated investors were employed in fields such as medicine, engineering, law, science, electronic data processing, government, business, etc.

Responses to items in the debriefing questionnaire concerning education and experience in investment analysis support the assertion that the subjects designated as sophisticated had a greater level of expertise in investment decision-making than those designated as unsophisticated. The sophisticated subjects had considerable investing experience in that investing is central to their professional duties. The unsophisticated subjects varied in their investing experience; four subjects described themselves as very frequent investors, eight as frequent investors, twelve as somewhat frequent investors, and 20 as infrequent investors. An inspection of Table 1 shows that the sophisticated subjects had a higher level of formal financial education than did the unsophisticated subjects. Table 1

also shows that education levels are about equally distributed between the respective treatment and control groups. Furthermore, it should be noted that the unsophisticated subjects are not necessarily less sophisticated relative to the general population, but are less sophisticated regarding their knowledge of investment decision-making relative to the professional investors in the present study.

Because the experiment was administered in person, the researcher ensured that the subjects had no information available other than the data in the research instrument. Responses to the debriefing questions and reactions observed by the researcher indicated that the subjects were very interested and involved in the experimental task.

There were a total of 88 subjects — 44 sophisticated, 22 of which were assigned to the control group (Cs) and 22 to the treatment group (Ts) — 44 unsophisticated, of which 22 were assigned to the control group, (Cu) and 22 to the treatment group (Tu).

Differences in response behavior between the T and C groups may be attributable to (1) RC usage, and/or (2) information load effects. To as-

TABLE 1. Analysis of financial education by subject classification

| Financial education*              | Sophisticated |         |        | Unsophisticated |         |        | Grand§ total |
|-----------------------------------|---------------|---------|--------|-----------------|---------|--------|--------------|
|                                   | Treatment     | Control | Total† | Treatment       | Control | Total‡ |              |
| Graduate degree major             | 11            | 10      | 21     | 3               | 4       | 7      | 28           |
| Undergraduate degree major        | 1             | 7       | 8      | 5               | 5       | 10     | 18           |
| 10–18 h college                   | 5             | 3       | 8      | 5               | 4       | 9      | 17           |
| 3–9 h college                     | 5             | 1       | 6      | 5               | 4       | 9      | 15           |
| Secondary and/or technical school | 0             | 1       | 1      | 1               | 2       | 3      | 4            |
| None                              | 0             | 0       | 0      | 3               | 3       | 6      | 6            |
| Total                             | 22            | 22      | 44     | 22              | 22      | 44     | 88           |

\*Highest level of formal education in accounting, finance, or investment analysis.

†The financial education level of sophisticated subjects in the treatment group did *not* differ significantly from that of sophisticated subjects in the control group;  $d.f. = 5$ ,  $\chi^2 = 8.7$  (NS).

‡The financial education level of unsophisticated subjects in the treatment group did *not* differ significantly from that of unsophisticated subjects in the control group;  $d.f. = 5$ ,  $\chi^2 = 0.7$  (NS).

§The financial education level of the sophisticated subjects were significantly greater than that of the unsophisticated subjects;  $d.f. = 5$ ,  $\chi^2 = 14.9$  ( $p < 0.01$ ).



TABLE 2. Classification of treatment subjects according to replacement cost usage

| Subject number            | $R^2_{10}$ | $R^2_5$ | U-score | F     | Sig   | Usage* class |
|---------------------------|------------|---------|---------|-------|-------|--------------|
| Sophisticated investors   |            |         |         |       |       |              |
| 1                         | 0.696      | 0.606   | 0.090   | 1.70  | 0.25  | L            |
| 2                         | 0.375      | 0.155   | 0.220   | 2.05  | 0.25  | L            |
| 3                         | 0.647      | 0.575   | 0.072   | 1.19  | 0.50  | L            |
| 4                         | 0.674      | 0.336   | 0.338   | 6.04  | 0.001 | H            |
| 5                         | 0.776      | 0.649   | 0.127   | 3.32  | 0.025 | H            |
| 6                         | 0.475      | 0.422   | 0.053   | 0.58  | 0.75  | L            |
| 7                         | 0.785      | 0.556   | 0.229   | 6.17  | 0.001 | H            |
| 8                         | 0.761      | 0.505   | 0.256   | 6.24  | 0.001 | H            |
| 9                         | 0.499      | 0.229   | 0.270   | 3.12  | 0.025 | H            |
| 10                        | 0.655      | 0.381   | 0.274   | 4.61  | 0.005 | H            |
| 11                        | 0.800      | 0.654   | 0.146   | 4.22  | 0.01  | H            |
| 12                        | 0.483      | 0.380   | 0.103   | 1.16  | 0.50  | L            |
| 13                        | 0.316      | 0.238   | 0.078   | 0.66  | 0.75  | L            |
| 14                        | 0.634      | 0.501   | 0.211   | 2.17  | 0.25  | L            |
| 15                        | 0.814      | 0.384   | 0.430   | 13.45 | 0.001 | H            |
| 16                        | 0.655      | 0.213   | 0.442   | 7.43  | 0.001 | H            |
| 17                        | 0.771      | 0.428   | 0.343   | 8.68  | 0.001 | H            |
| 18                        | 0.421      | 0.355   | 0.066   | 0.66  | 0.75  | L            |
| 19                        | 0.458      | 0.318   | 0.140   | 1.50  | 0.25  | L            |
| 20                        | 0.300      | 0.254   | 0.046   | 0.39  | 0.99  | L            |
| 21                        | 0.863      | 0.479   | 0.384   | 16.34 | 0.001 | H            |
| 22                        | 0.841      | 0.809   | 0.032   | 1.20  | 0.50  | L            |
| Unsophisticated investors |            |         |         |       |       |              |
| 23                        | 0.806      | 0.399   | 0.407   | 12.16 | 0.001 | H            |
| 24                        | 0.751      | 0.498   | 0.253   | 5.90  | 0.001 | H            |
| 25                        | 0.846      | 0.590   | 0.256   | 9.64  | 0.001 | H            |
| 26                        | 0.678      | 0.570   | 0.108   | 1.20  | 0.50  | L            |
| 27                        | 0.674      | 0.358   | 0.316   | 5.64  | 0.005 | H            |
| 28                        | 0.530      | 0.223   | 0.307   | 3.78  | 0.01  | H            |
| 29                        | 0.891      | 0.857   | 0.034   | 1.79  | 0.25  | L            |
| 30                        | 0.301      | 0.232   | 0.069   | 0.57  | 0.75  | L            |
| 31                        | 0.567      | 0.303   | 0.264   | 3.55  | 0.025 | H            |
| 32                        | 0.359      | 0.288   | 0.071   | 0.65  | 0.75  | L            |
| 33                        | 0.479      | 0.328   | 0.151   | 1.69  | 0.25  | L            |
| 34                        | 0.759      | 0.729   | 0.030   | 0.71  | 0.75  | L            |
| 35                        | 0.643      | 0.293   | 0.350   | 5.69  | 0.001 | H            |
| 36                        | 0.341      | 0.266   | 0.075   | 0.67  | 0.75  | L            |
| 37                        | 0.692      | 0.566   | 0.126   | 2.36  | 0.10  | L            |
| 38                        | 0.703      | 0.635   | 0.068   | 1.33  | 0.50  | L            |
| 39                        | 0.777      | 0.693   | 0.084   | 2.18  | 0.10  | L            |
| 40                        | 0.460      | 0.129   | 0.331   | 3.56  | 0.025 | H            |
| 41                        | 0.678      | 0.478   | 0.200   | 3.59  | 0.025 | H            |
| 42                        | 0.783      | 0.610   | 0.173   | 4.61  | 0.005 | H            |
| 43                        | 0.673      | 0.314   | 0.359   | 6.35  | 0.001 | H            |
| 44                        | 0.780      | 0.686   | 0.094   | 2.49  | 0.10  | L            |

\*H (L) indicates relatively high (low) RC usage.

certain the impact of RC usage, it is necessary to separate the T group into subgroups of relatively high and low RC users. Differences between high RC users and control subjects would be attributed to both RC usage and information load, whereas differences between low RC users and control subjects would be less attributed to RC usage and hence more attributed to information load. RC usage was measured by determining the importance of the RC ratio set in explaining the variance in each subjects' predictions, and thus used to evenly divide both the Ts and Tu groups into subgroups of relatively high and low RC users.

Standardized linear regressions with the subjects' predictions as the dependent variable were used to measure the impact of the RC cue set on the responses of the T group subjects. The "usefulness" measure (U-score) was used to measure cue set importance, and is defined as the decrease in  $R^2$  resulting from the elimination of a given cue set from the regression.<sup>6</sup> The U-score for the RC cue set was computed as follows: first, the  $R^2$  was computed with all ten ratios as independent variables; next, the  $R^2$  was computed with only the five HC ratios as independent variables. The U-score is the difference in  $R^2$  between the ten and five variable models. Each U-score was tested for statistical significance using the following standard models comparison test (McNemar, 1969, p. 321):

$$\frac{(R^2_{10} - R^2_5)/5}{(1 - R^2_{10})/29} = F; d.f. = 5, 29$$

where  $R^2_{10} = R^2$  of the full ten ratio model

$R^2_5 = R^2$  of the five ratio HC model.

In each of the sophisticated and unsophisticated T groups the subjects with the eleven highest  $F$  statistics associated with their U-scores were considered relatively high RC users (Th), while the remainder were considered relatively

low RC users (Tl). The results of this median-split classification of subjects are given in Table 2. Th subjects did not necessarily use RC information more than they used HC information, nor did Th subjects necessarily use HC information less than Tl subjects. However, one can say that Th subjects were more likely to have used RC information to a relatively greater degree than Tl subjects.

The median-split of both sophisticated and unsophisticated subjects in the treatment group into groups of relatively high and low RC users creates the following four subgroups of eleven members each: (1) sophisticated high RC users, Tsh; (2) sophisticated low RC users, Tsl; (3) unsophisticated high RC users, Tuh; and (4) unsophisticated low RC users, Tul. Summary statistics related to the U-score analysis for these four subgroups as compiled from Table 2 are presented in Table 3. An inspection of Table 3 shows that the mean U-scores for both high RC user subgroups are significantly greater than those for the two low user subgroups. Also, no significant difference in mean U-score is shown between sophisticated and unsophisticated subjects in either the high or low RC user groups.

This study also employed a subjective measure of cue importance. Subjects were asked to spread 100 points over the cues according to the relative influence they perceived each to have had on their predictions. The analysis in Table 4 supports the ability of the U-score's significance test to classify subjects according to RC usage. The assignment of subjective weights to the RC cue set is significantly associated with the classification of both sophisticated and unsophisticated subjects as either relatively high or low RC users.<sup>7</sup>

#### *Dependent variables*

*Accuracy.* In many human information processing studies, accuracy is measured by the

<sup>6</sup> For a discussion of the U-score and other statistical measures of cue importance see Darlington (1968).

<sup>7</sup> The dominance of a particular group by random response models or extreme market predispositions are potential biases to the analyses.

To control for the former, U-scores were also computed for the HC cue set. Four sophisticated and four unsophisticated

TABLE 3. Summary statistics, U-score analysis

|     | $R^2_{10}$ |        |       | $R^2_5$ |        |       | U-Score |        |       | $t$ -values* |       |       |
|-----|------------|--------|-------|---------|--------|-------|---------|--------|-------|--------------|-------|-------|
|     | Mean       | Median | SD.   | Mean    | Median | SD.   | Mean    | Median | SD.   | Tsh          | Tul   | Tsh   |
| Tsl | 0.513      | 0.475  | 0.171 | 0.419   | 0.380  | 0.191 | 0.101   | 0.078  | 0.064 | Tsl          | 6.68† | 0.83  |
| Tsh | 0.732      | 0.771  | 0.103 | 0.438   | 0.428  | 0.149 | 0.294   | 0.274  | 0.105 | Tsh          | 0.06  | 6.35† |
| Tul | 0.615      | 0.692  | 0.206 | 0.532   | 0.570  | 0.217 | 0.083   | 0.075  | 0.036 | Tul          | 8.78† |       |
| Tuh | 0.674      | 0.674  | 0.120 | 0.381   | 0.358  | 0.151 | 0.292   | 0.307  | 0.070 | Tuh          |       |       |

\*Test  $H_0$  that the U-scores of the respective column and row subgroups do not differ.

† $t$ -values significant at the 0.001 level.

TABLE 4. Analysis of mean subjective cue set weights according to treatment groups

|                    |  | Mean subjective<br>cue set weights |    |               |                |
|--------------------|--|------------------------------------|----|---------------|----------------|
| Treatment<br>Group |  | HC                                 | RC | Row<br>totals | $\chi^2$ (Sig) |
| Th                 |  | 51                                 | 49 | 100           |                |
| Tl                 |  | 73                                 | 27 | 100           |                |
| Total              |  | 124                                | 76 | 200           | 10.27 (.010)   |
| Tsh                |  | 52                                 | 48 | 100           |                |
| Tsl                |  | 79                                 | 21 | 100           |                |
| Total              |  | 131                                | 69 | 200           | 16.13 (.001)   |
| Tuh                |  | 50                                 | 50 | 100           |                |
| Tul                |  | 68                                 | 32 | 100           |                |
| Total              |  | 118                                | 82 | 200           | 6.70 (.010)    |

achievement score ( $r_a$ ) which is the correlation between subject predictions ( $Y_s$ ) and the actual values of the predicted or environmental variable ( $Y_e$ ), see Wright (1977, 1979), Ashton (1981), Hammond *et al.* (1964), and Brunswik (1952). However, correlational measures of accuracy such as  $r_a$  can be misleading if the focus is on the level of accuracy rather than on the extent to which  $Y_s$  and  $Y_e$  move together (Ashton, 1985).<sup>8</sup> Because levels of accuracy are important in the present study, a variance approach was used to measure accuracy. This approach mea-

sures the dispersion of predictions around the correct predictions and is the average sum of the squared differences between the subjects' predictions and the correct predictions for each group (hereafter the accuracy variance, see equation 1). The group having the highest (lowest) average accuracy variance was considered the group having made the least (most) accurate predictions.

$$AV_k = \frac{1}{mn} \sum_{j=1}^m \sum_{i=1}^n (Y_{ij} - Y_{ej})^2 \quad (1)$$

investors were identified as low users of both data sets suggesting random or nonlinear response models, and a potential negative influence on consensus. The frequency and distribution of these subjects does not appear as a threat to the consensus analysis or the manner in which subjects were classified according to RC usage.

To control for market predispositions, each subject was asked to predict the one-year percentage change in the New York Stock Exchange Index; a oneway analysis of variance and the Scheffe multiple comparison procedure involving the six subgroups (Cs, Cu, Tsl, Tul, Tsh, and Tuh) indicated that the groups did not differ significantly regarding market outlook.

<sup>8</sup> For a discussion of other circumstances when correlational statistics such as the achievement score may be suspect in human information processing research, see Schepanski (1983).

where  $\overline{AV}_k$  = average accuracy variance for subject group  $k$ ,  $m = 40$  case observations (firms),  $n$  = number of subjects in group  $k$ ,  $Y_{sjf}$  = the  $i$ th subject's prediction for the  $j$ th firm,  $Y_{ej}$  = the actual one-year percentage price change for the  $j$ th firm (environmental or distal variable).

The accuracy concept as embodied in equation (1) is similar to a mean square error approach that appears often in econometric studies as a forecasting error. This approach is also frequently used in meteorology where the accuracy of weather forecast is measured by summing the squared differences between probability predictions and the actual frequency of occurrence of various classes of weather conditions, see Murphy (1973, 1974), and Murphy & Winkler (1970). This concept is also used to measure the accuracy of subjective probability assessments in psychological experiments involving calibration analysis, see Lichtenstein & Fischhoff (1977, 1980, p. 151), and Ashton (1982, pp. 88–90).

*Consensus.* In the present study, consensus is defined as inter-subject agreement. Predictive-judgements that are in agreement tend to be less dispersed. Subject responses become dispersed when they are based upon salient cues that are undisclosed, and hence have to be estimated. Estimation error, one cause of dispersion, is eliminated when such cues are disclosed. Response variance, a measure of dispersion, was used as an inverse measure of consensus; see equation (2). The group having the highest (lowest) average response variance was considered the group having the least (most) consensus. This consensus concept and computation is consistent with that of Ashton (1977), and Ijiri & Jaedicke (1966).

$$\overline{RV}_k = \frac{1}{mn} \sum_{j=1}^m \sum_{i=1}^n (Y_{sjf} - \bar{Y}_{sjk})^2 \quad (2)$$

where  $\overline{RV}_k$  = average price change response variance for subject group  $k$ ,  $m = 40$  case observations (firms),  $n$  = number of subjects in group  $k$ ,  $Y_{sjf}$  = the  $i$ th subject's prediction for the  $j$ th firm,  $\bar{Y}_{sjk}$  = the mean prediction of the  $n$  subjects in

group  $k$  for the  $j$ th firm.

Because increased consensus results from the reduction of estimation errors, consensus is often cited as a surrogate for accuracy in the absence of objective predictability criteria (Libby, 1981, p. 31). Einhorn (1974) describes consensus as a necessary but not a sufficient condition for accuracy in the sense that some subjects will be inaccurate if consensus is lacking. The relationship between accuracy and consensus is shown in equation (3), the latter is a perfect surrogate for the former when the second term is zero; that is, when the mean judgment for each group is the correct response.

$$\overline{AV}_k = \overline{RV}_k + \frac{1}{m} \sum_{j=1}^m (\bar{Y}_{sjk} - Y_{ej})^2 \quad (3)$$

In short, accuracy is consensus plus the group mean squared average error. Nevertheless, virtually no empirical evidence linking accuracy and consensus existed until Ashton (1985) found strong correlations between accuracy and consensus in two different experimental settings, one involving sales predictions of managers, the other involving going-concern predictions of auditors. However, more research is needed before such findings can be generalized to other settings.

### Analysis

The five hypotheses in the Background section involve both dependent variables accuracy and consensus, and were tested using a  $2 \times 2 \times 2 \times 2 \times 20$  unbalanced repeated measures analysis of variance (ANOVA) design with nested effects. The first three factors — sophistication, data set and RC usage — are between-subject variables, and the last two — industry type and firm — are within-subject variables.

The firm variable has 20 levels to represent the 20 firms in each industry, and is nested within the industry variable which has two levels, chemical firms and drug firms. The within-subject variables were included in the ANOVA model to capture industry and firm effects, and are not the subject of any formal hypothesis testing.

The sophistication variable has two levels, sophisticated investor and unsophisticated investor, and has 44 subjects in each category. The data set variable likewise consists of two levels, dual data set (HC and RC cues) and single data set (HC cues), and has 44 subjects in each category. The RC usage variable also has two levels, high RC usage and low RC usage, and has 22 subjects in each category. This latter factor causes the design to be unbalanced. The Ts and Tu groups were both split into two groups based upon RC usage and consisting of eleven members each; the Cs and Cu groups were not subdivided. Thus, empty cells would exist for the control groups at the eleven membered group level. In other words, whereas sophistication effects can be observed within both the treatment and control groups, RC usage effects can be observed in the former but not in the latter.

Two adjustments to the ANOVA model were included in the analysis to take into consideration the unbalanced design. First, the five factor model was collapsed into a four factor model with the ANOVA procedure being performed on three variations of the latter model. In each of these three subdesigns, the data set and RC usage variables were collapsed into a single variable (hereafter, the cue variable). The three ANOVA variations differ only with respect to the levels of the cue variable. Variation A is a  $2 \times 3 \times 2 \times 20$  subdesign with the cue variable consisting of three levels — no RC data (control group subjects,  $n = 44$ ), low RC usage (Tl subjects,  $n = 22$ ), and high RC usage (Th subjects,  $n = 22$ ). Variation B is a  $2 \times 2 \times 2 \times 20$  subdesign with the cue variable consisting of two levels — treatment group subject ( $n = 44$ ) and control group subject ( $n = 44$ ). In other words, the cue variable reduces to the original data set variable, and the two between-subject variables in variation B are crossed and balanced (Hays, 1973, p. 493). The cue variable also consists of two levels in variation C — high RC usage (Th subjects,  $n = 22$ ), and other than high RC usage (low RC users

and control subjects,  $n = 66$ ).

Information load and RC usage effects cannot be completely separated from the cue variable. However, variation B focuses more on information load effects in that Tl subjects are combined with Th subjects (both groups received the dual data set). Thus, variation B is more relevant to testing hypotheses (2) and (4), which involve the data set variable and its interaction with sophistication, respectively. On the other hand, variation C focuses more on RC usage effects in that low RC users are combined with control group subjects (neither group is associated with relatively high RC usage). Hence, variation C is more germane to testing hypotheses (3) and (5), those dealing with RC usage and its interaction with sophistication, respectively. Variation A involves the combined effects of information load and RC usage since the Tl subjects are a separate category; hence, this variation is relevant to both data set and RC usage hypotheses. The sophistication variable, hypothesis (1), is addressed in all three variations.

The second adjustment related to the unbalanced design was the use of partial sum of the squares in the numerator of the  $F$  ratios used in the statistical significance tests.<sup>9</sup> The denominator of the  $F$  ratios for the between-subject effects was the mean square associated with the subject effects as nested in the two-way interaction between sophistication and cue variable effects. The  $F$  ratio denominator for the within-subject effects was the mean square associated with the firm effects as nested within the industry variable.

The  $F$  ratios used in the present study provide for more rigorous and focused hypotheses testing, and are more appropriate given the repeated measures design.  $F$  ratios computed using the mean square error for the full model would tend to be inflated because they fail to account for random variations across the 88 subjects and across the 40 firms.

<sup>9</sup> Partial or type III sum of the squares for a given variable are those that result when that variable is added last to a model, and should be used in hypotheses testing in unbalanced ANOVA designs, see SAS Institute (1985, pp. 435–467).

## RESULTS

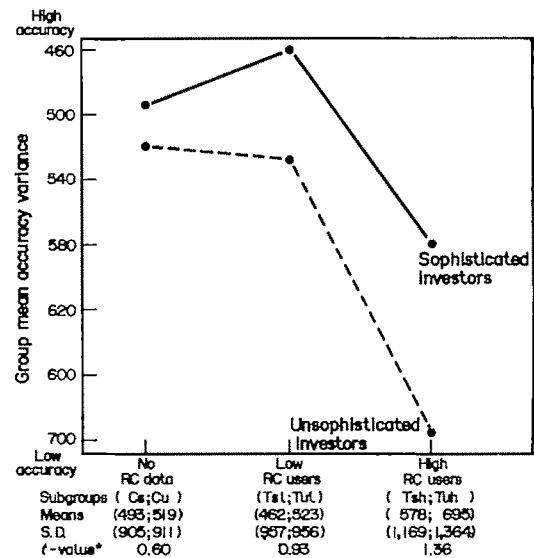
*Share price predictions*

Summary statistics for the raw share price predictions are presented in Table 5. The Cs and Cu groups had significantly higher (i.e. more optimistic) mean share price predictions than the Ts and Tu groups, respectively. The only other significant difference was that the Tul group had higher mean predictive judgments than the Tuh group. The more optimistic predictions of the control groups is more consistent with the actual mean share price change of the 40 firms (see Table 5, notes). Thus, one would expect, *ceteris paribus*, the accuracy of the investors in the control groups to exceed that of those in the various treatment groups.

*Accuracy*

The summary statistics for accuracy variance are reported in Table 6. Consistent with the previous discussion related to Table 5, the accuracy of the control groups is superior to that of the treatment groups; but the differences are not statistically significant. The mean accuracy variances for the Tl and Tul groups are significantly lower (i.e. indicate a greater level of accuracy) than those of the Th and Tuh groups, respectively. This finding suggests a possible negative association between accuracy and RC usage.

The results of the five hypotheses test that were stated in the Background section are reported in Table 7 using the ANOVA model with accuracy variance as the dependent variable. The cue variable factor is significant in version A of the ANOVA model where this factor is represented by three levels; no RC data, low RC usage, and high usage. Thus, RC usage and/or information load had a significant main effect on accuracy. Moreover, the cue variable factor was significant in version C, but not in version B. The former focuses more on RC usage while the latter focuses more on information load. Thus,  $H_0(3)$  is rejected and  $H_0(2)$  is accepted. These



\*Test for differences between the means of the contrasted groups.

Fig. 2. Accuracy variance graphs.

findings indicate that the dual data set did influence accuracy, and the influence was more likely attributed to RC usage than to information load effects. An inspection of Fig. 2 shows that the influence of RC usage on accuracy was negative. The mean accuracy variances of the sophisticated and unsophisticated high RC users were considerably greater than the mean accuracy variances of the respective low RC user and control (no RC data) groups.

According to Fig. 2, the accuracy of the sophisticated subjects was consistently superior to that of the unsophisticated subjects. However, according to Table 7, sophistication was not a significant main effect as  $H_0(1)$  was not rejected. Furthermore,  $H_0(3)$  and  $H_0(4)$  were also not rejected indicating no significant interactive effects between sophistication and either RC usage or information load, respectively.

The only two-way effects that were significant in the ANOVA model occurred between the cue variable and firm effects as nested within industry type.<sup>10</sup> Also significant were the subject ef-

<sup>10</sup> All possible two, three and four way interactive effects were not included in the ANOVA models in Tables 7 and 9 because inclusion of such would only improve the  $R^2$  statistic by less than 0.01, and these effects are not relevant to the research questions addressed in the present study.

TABLE 5. Summary statistics, raw percentage price change predictions ( $Y_{df}$ )

| Group                        | <i>n</i> | Mean  | SD.   | <i>t</i> -value* | Group                          | <i>n</i> | Mean  | SD.   | <i>t</i> -value* |
|------------------------------|----------|-------|-------|------------------|--------------------------------|----------|-------|-------|------------------|
| All subjects†                | 88       | 1.59% | 13.58 |                  | Sophisticated (S)              | 44       | 1.23% | 12.73 |                  |
|                              |          |       |       |                  | Unsophisticated (U)            | 44       | 1.95  | 14.37 | 1.56             |
| Treatment (T)                | 44       | -0.01 | 14.03 |                  | Low RC users (Tl)              | 44       | 0.28  | 11.55 |                  |
| Control (C)                  | 44       | 3.19  | 12.91 | 7.04§            | High RC users (Th)             | 44       | -0.30 | 16.14 | 0.86             |
| Treatment sophisticated (Ts) | 22       | -0.05 | 12.89 |                  | Treatment unsophisticated (Tu) | 22       | 0.03  | 15.10 |                  |
| Control sophisticated (Cs)   | 22       | 2.51  | 12.44 | 4.23§            | Control unsophisticated (Cu)   | 22       | 3.87  | 13.33 | 5.66§            |
| Ts low RC use (Tsl)          | 11       | -0.74 | 10.79 |                  | Tu low RC use (Tul)            | 11       | 1.30  | 12.19 |                  |
| Ts high RC use (Tsh)         | 11       | 0.65  | 14.68 | 1.60             | Tu high RC use (Tuh)           | 11       | -1.25 | 17.45 | 2.51‡            |

\*Test for difference between the means of the contrasted groups.

†The mean and SD of the actual percentage price changes ( $Y_{df}$ ) were 3.63% and 18.47, respectively.‡ $p \leq 0.01$ ; § $p \leq 0.001$ TABLE 6. Summary statistics, accuracy variance ( $Y_{df} - Y_{df}$ )<sup>2</sup>

| Group                        | <i>n</i> | Mean | SD.  | <i>t</i> -value* | Group                          | <i>n</i> | Mean | SD.  | <i>t</i> -value* |
|------------------------------|----------|------|------|------------------|--------------------------------|----------|------|------|------------------|
| All subjects                 | 88       | 535† | 1023 |                  | Sophisticated (S)              | 44       | 507  | 990  |                  |
|                              |          |      |      |                  | Unsophisticated (U)            | 44       | 564  | 1055 | 1.66             |
| Treatment (T)                | 44       | 564  | 1127 |                  | Low RC users (Tl)              | 44       | 493  | 956  |                  |
| Control (C)                  | 44       | 506  | 908  | 1.69             | High RC users (Th)             | 44       | 636  | 1271 | 2.68§            |
| Treatment sophisticated (Ts) | 22       | 520  | 1069 |                  | Treatment unsophisticated (Tu) | 22       | 609  | 1180 |                  |
| Control sophisticated (Cs)   | 22       | 493  | 905  | 0.57             | Control unsophisticated (Cu)   | 22       | 519  | 911  | 1.78             |
| Ts low RC use (Tsl)          | 11       | 462  | 957  |                  | Tu low RC use (Tul)            | 11       | 523  | 956  |                  |
| Ts high RC use (Tsh)         | 11       | 578  | 1169 | 1.61             | Tu high RC use (Tuh)           | 11       | 695  | 1364 | 2.16‡            |

\*Test for difference between the means of the contrasted groups.

†Accuracy variance is an inverse measure of accuracy.

‡ $p \leq 0.05$ ; § $p \leq 0.01$

TABLE 7. Analysis of variance, accuracy variance  $(Y_{ij} - Y_{ij})^2$ 

| Cue variable levels                         | Variation A<br>C; Ti; Th |       |        |          | Variation B<br>C; T |                    |       |        | Variation C<br>[C, Ti]; Th |                |                    |       |        |          |                |
|---------------------------------------------|--------------------------|-------|--------|----------|---------------------|--------------------|-------|--------|----------------------------|----------------|--------------------|-------|--------|----------|----------------|
|                                             | Sum of<br>squares*       | d.f.  | F      | PR<br>>F | H <sub>o</sub>      | Sum of<br>squares* | d.f.  | F      | PR<br>>F                   | H <sub>o</sub> | Sum of<br>squares* | d.f.  | F      | PR<br>>F | H <sub>o</sub> |
| Between subjects                            |                          |       |        |          |                     |                    |       |        |                            |                |                    |       |        |          |                |
| Sophistication                              | 3,585                    | 1     | 2.01   | 0.160    | ( 1)                | 2,868              | 1     | 1.55   | 0.217                      | (1)            | 3,894              | 1     | 2.24   | 0.139    | (1)            |
| Cue variable                                | 12,080                   | 2     | 3.39   | 0.038    | (2,3)§              | 2,988              | 1     | 1.61   | 0.207                      | (2)            | 11,971             | 1     | 6.87   | 0.010    | (3)§           |
| Sophistication cue<br>variable              | 1,206                    | 2     | 0.34   | 0.714    | (4,5)               | 859                | 1     | 0.46   | 0.498                      | (4)            | 1,032              | 1     | 0.59   | 0.444    | (5)            |
| Subject (sophistication<br>X cue variable)† | 146,030                  | 82    | 7.75   | 0.001    |                     | 155,468            | 84    | 7.91   | 0.001                      |                | 146,312            | 84    | 7.55   | 0.001    |                |
| Within subjects                             |                          |       |        |          |                     |                    |       |        |                            |                |                    |       |        |          |                |
| Industry                                    | 84,961                   | 1     | 1.30   | 0.262    |                     | 87,605             | 1     | 1.27   | 0.266                      |                | 80,423             | 1     | 1.38   | 0.247    |                |
| Firm (industry)‡                            | 2,491,891                | 38    | 285.39 | 0.001    |                     | 2,614,121          | 38    | 294.07 | 0.001                      |                | 2,212,674          | 38    | 252.51 | 0.001    |                |
| Subject and firm<br>interactions            |                          |       |        |          |                     |                    |       |        |                            |                |                    |       |        |          |                |
| Sophistication X firm<br>(industry)         | 5,112                    | 39    | 0.57   | 0.985    |                     | 5,112              | 39    | 0.56   | 0.988                      |                | 5,112              | 39    | 0.57   | 0.986    |                |
| Cue variable<br>X firm (industry)           | 62,890                   | 78    | 3.51   | 0.001    |                     | 40,143             | 39    | 4.40   | 0.001                      |                | 51,198             | 39    | 5.69   | 0.001    |                |
| Error                                       | 752,754                  | 3,276 |        |          |                     | 775,500            | 3,315 |        |                            |                | 764,445            | 3,315 |        |          |                |

\*Partial sum of squares figures are in thousands.

†Subject effects nested within sophistication by cue variables; the mean square associated with this term was used as the denominator in computing the *F* ratio for the between subject effects. The model error was used to compute the *F* ratio for this nested effect.‡Firm effects nested within industry type; the mean square associated with this term was used as the denominator in computing the *F* ratio for the industry effect. The model error was used to compute the *F* ratio for this nested effect.§H<sub>0</sub> is rejected at the 0.05 level.



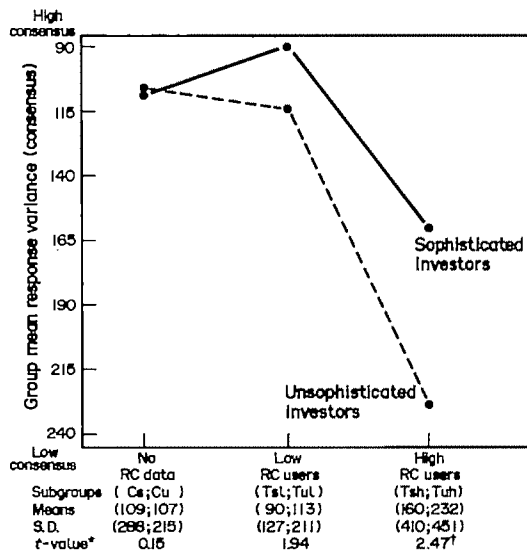
fects as nested within the sophistication by cue variable effects. These findings suggest that much variance in accuracy is attributed to individual differences across subjects and firms.

### Consensus

According to the summary statistics for consensus as reported in Table 8, control group subjects, sophisticated investors, and low RC users exhibited significantly greater consensus than treatment group subjects, unsophisticated investors, and high RC users, respectively. These findings suggest that sophistication is positively related to consensus while information load and RC usage are negatively associated with this measure of decision-quality.

Much of the significance reported in Table 8 is absent from the ANOVA model in Table 9. The ANOVA model, unlike the *t*-test, controls or accounts for random effects across subjects and firms by the nesting of these factors. Although sophisticated subjects are shown in Table 8 and Fig. 3 to exhibit greater consensus than unsophisticated subjects,  $H_0(1)$  was nevertheless accepted. Sophistication was not a significant effect in any of the ANOVA versions in Table 9.

The cue variable factor was significant in only version C of the ANOVA model in Table 9. This



\*Test for differences between the mean of the contrasted groups.

Fig. 3. Response variance (consensus) graphs.

TABLE 8. Summary statistics, response variance (consensus)  $(Y_{ij} - \bar{Y}_{jk})^2$

| Group                        | n  | Mean | S.D. | t-value* | Group                          | n  | Mean | S.D. | t-value* |
|------------------------------|----|------|------|----------|--------------------------------|----|------|------|----------|
| All subjects                 | 88 | 129† | 297  |          | Sophisticated (S)              | 44 | 117  | 297  |          |
|                              |    |      |      |          | Unsophisticated (U)            | 44 | 140  | 296  | 2.27†    |
| Treatment (T)                | 44 | 149  | 333  |          | Low RC users (Tl)              | 44 | 101  | 174  |          |
| Control (C)                  | 44 | 108  | 254  | 4.04§    | High RC users (Th)             | 44 | 196  | 432  | 6.02§    |
| Treatment sophisticated (Ts) | 22 | 125  | 305  |          | Treatment unsophisticated (Tu) | 22 | 172  | 357  |          |
| Control sophisticated (Cs)   | 22 | 109  | 288  | 1.12     | Control unsophisticated (Cu)   | 22 | 107  | 215  | 4.62§    |
| Ts low RC use (Tsl)          | 11 | 90   | 127  |          | Tu low RC use (Tul)            | 11 | 113  | 211  |          |
| Ts high RC use (Tsh)         | 11 | 160  | 410  | 3.42§    | Tu high RC use (Tuh)           | 11 | 232  | 451  | 5.02§    |

\*Test for difference between the means of the contrasted groups.

†Response variance is an inverse measure of consensus.

‡ $p \leq 0.05$ ; § $p \leq 0.001$

TABLE 9. Analysis of variance, consensus  $(Y_{ij} - \bar{Y}_{\#})^2$ 

| Cue variable levels               | Variation A<br>C, Tl; Th |       |       |          | Variation B<br>C, T |                    |       |       | Variation C<br>[C, Tl]; Th |                |                    |       |       |          |                |
|-----------------------------------|--------------------------|-------|-------|----------|---------------------|--------------------|-------|-------|----------------------------|----------------|--------------------|-------|-------|----------|----------------|
|                                   | Sum of<br>squares*       | d.f.  | F     | PR<br>>F | H <sub>o</sub>      | Sum of<br>squares* | d.f.  | F     | PR<br>>F                   | H <sub>o</sub> | Sum of<br>squares* | d.f.  | F     | PR<br>>F | H <sub>o</sub> |
| Between subjects                  |                          |       |       |          |                     |                    |       |       |                            |                |                    |       |       |          |                |
| Sophistication                    | 742                      | 1     | 0.53  | 0.467    | ( 1)                | 454                | 1     | 0.32  | 0.571                      | (1)            | 987                | 1     | 0.73  | 0.396    | (1)            |
| Cue variable                      | 5,369                    | 2     | 1.94  | 0.151    | (2,3)               | 1,433              | 1     | 1.02  | 0.315                      | (2)            | 5,341              | 1     | 3.94  | 0.050    | (3)§           |
| Sophistication X<br>cue variable  | 796                      | 2     | 0.29  | 0.751    | (4,5)               | 532                | 1     | 0.38  | 0.540                      | (4)            | 706                | 1     | 0.52  | 0.472    | (5)            |
| Subject (soph X cue<br>variable)† | 113,731                  | 82    | 25.89 | 0.001    |                     | 117,931            | 84    | 26.07 | 0.001                      |                | 113,849            | 84    | 25.43 | 0.001    |                |
| Within subjects                   |                          |       |       |          |                     |                    |       |       |                            |                |                    |       |       |          |                |
| Industry                          | 544                      | 1     | 4.92  | 0.033    |                     | 382                | 1     | 2.84  | 0.100                      |                | 807                | 1     | 6.32  | 0.016    |                |
| Firm (industry)‡                  | 4,202                    | 38    | 2.06  | 0.001    |                     | 5,101              | 38    | 2.49  | 0.001                      |                | 4,855              | 38    | 2.40  | 0.001    |                |
| Subject and firm interactions     |                          |       |       |          |                     |                    |       |       |                            |                |                    |       |       |          |                |
| Soph X firm (Industry)            | 2,589                    | 39    | 1.24  | 0.147    |                     | 2,589              | 39    | 1.23  | 0.153                      |                | 2,589              | 39    | 1.25  | 0.141    |                |
| Cue variable X firm<br>(industry) | 5,777                    | 78    | 1.38  | 0.016    |                     | 2,706              | 39    | 1.29  | 0.109                      |                | 4,609              | 39    | 2.22  | 0.001    |                |
| Error                             | 175,477                  | 3,276 |       |          |                     | 178,548            | 3,315 |       |                            |                | 176,645            | 3,315 |       |          |                |

\*Partial sum of squares figures are in thousands.

†Subject effects nested within sophistication by cue variables," the mean square associated with this term was used as the denominator in computing the *F* ratio for the between subject effects. The model error was used to compute the *F* ratio for this nested effect.‡Firm effects nested within industry type," the mean square associated with this term was used as the denominator in computing the *F* ratio for the industry effect. The model error was used to compute the *F* ratio for this nested effect.§*H*<sub>0</sub> is rejected at the 0.05 level.

finding suggests that the dual data set on the whole had no statistically significant main effect on consensus, but the effect was significant in the subdesign that focused more on RC usage. Furthermore, according to Fig. 3, the impact of RC usage on consensus was negative. Similar to the accuracy findings,  $H_0(3)$  was the only one of the five null hypotheses stated in the Background section that was rejected. No significant two-way effects were observed between sophistication and either information load or RC usage, hence the acceptance of  $H_0(4)$  and  $H_0(5)$ , respectively.

Similar to the accuracy findings is the observation that much variance in consensus is attributable to random differences across subjects and firms. This occurrence is apparent in the high significance levels attached to the main effects of the nested subject and firm variables in all three ANOVA subdesigns in Table 9 as well as in Table 7. In addition, unlike the accuracy case, a significant industry main effect is present in ANOVA versions of A and C of the consensus model. Thus, in addition to the random effects associated with differences across subjects and firms, industry type also accounted for significant variance in consensus.

To sum up, after controlling for industry, and random firm and subject effects, sophistication had no statistically significant effect on accuracy and consensus. Subjects receiving the dual data set had significantly poorer accuracy than those receiving only the HC cues, no statistically significant difference was observed for consensus. RC usage, however, was associated with significantly poorer accuracy and consensus. Finally, the information load effects of coping with the expanded cue set had apparently little influence on accuracy and consensus.

## DISCUSSION

The results reported in the previous section will be discussed in view of the experimental ex-

pectations and the studies covered in the Background section of this paper. The accuracy and consensus findings were to a limited extent similar to and consistent with expectations. Sophisticated investors because of their expertise were expected to exhibit greater accuracy and consensus than the unsophisticated subjects. However, sophistication had no statistically significant main effect on accuracy and consensus in the present study. Nevertheless, with the exception that the Cu group had slightly greater consensus than the Cs group, the sophisticated subjects consistently outperformed the unsophisticated subjects on both indicators of decision-quality. Also, as expected, differences in mean accuracy and consensus between sophisticated and unsophisticated subjects was greater within the treatment group where the investors had to cope with the dual data set. The positive association between sophistication and performance was overshadowed by the large variances in the ANOVA subdesigns that were accounted for by the nested subjects and firms variables; hence, no statistically significant relationships regarding sophistication can be reported based on the ANOVA model.<sup>11</sup> However, these findings may or may not have operational significance.

Statistically significant findings were observed for the cue variable. The dual data set had an overall negative impact on accuracy, and no statistically significant impact on consensus. When the dual set was examined in terms of its information load and RC usage components, the former had no impact on accuracy and consensus, while the latter was statistically significant and inversely related to both aspects of decision-quality. The negative impact of RC usage was more pronounced regarding the performance of the unsophisticated subjects. The unsophisticated investors in the control group and in the low RC user group differed little regarding accuracy and consensus. On the other hand, the decision-quality of the unsophisticated subjects in

<sup>11</sup> Sophistication would have had a strong significant main effect if the mean square error for the model instead of the mean square associated with the subject (sophistication  $\times$  cue variance) effect had been used as the denominator of the  $F$  ratio in the significance test. However, this approach would have failed to isolate the random effects associated with the subjects and firms.

the high RC user group was noticeably below that of the other unsophisticated investors (see Figs 2 and 3). Furthermore, an inspection of Figs 2 and 3 shows that the relationship between decision-quality and the dual data set among the sophisticated subjects was somewhat similar to the inverted-U function as reported by Shields (1983). Among the sophisticated investors, low RC usage was associated with slightly superior accuracy and consensus over those investors having no RC cues, whereas high RC usage was associated with substantially inferior decision-quality in comparison to the control subjects.

The results do not conflict with the findings of the market studies which concluded that RC disclosures had no incremental information content. One reason offered for such findings that is germane to the present study is that market participants ignored the ASR 190 disclosures because they were unfamiliar (Watts & Zimmerman, 1980). Although the present study identified those subjects who were not likely to have ignored the RC cues, such data were nonetheless unfamiliar relative to the HC data. This lack of familiarity could have been responsible for the low consensus and accuracy among the Th subjects, especially the Tuh group. In addition, the finding that Th subjects exhibited lower performance than Tl subjects was consistent with Beaver *et al.* (1982) who concluded that RC earnings provided no marginal information over HC earnings. If the RC numbers had in fact provided incremental information, the performance of the Th group would have been expected to be

greater than that of the Tl group; however, the reverse was found in the present study.

## CONCLUSION

To sum up, the RC data set was associated with lower accuracy and consensus, and this poorer performance was more likely attributable to RC usage than an artifact of information load. Sophistication did not appear as statistically significant in the ANOVA model which accounted for the substantial random variation across subjects and firms. Nevertheless, the negative association between RC usage and decision-quality was more noticeable among the unsophisticated subjects.

Caution should be exercised when attempting to draw definitive conclusions from the findings of the present study. Here, as with most experiments, the ability to generalize from the results is uncertain. Such studies are weak in theoretical support, realism, and external validity. The strength of these results may be tenuous when extended to situations other than those relevant to the firms, variables and investors that were used in this experiment. Indeed, additional research is needed on the human information processing of inflation accounting data before any substantive conclusions can be drawn. Possible extensions include manipulating the case observations to examine how performance varies with capital intensity, and performing a multi-period analysis with feedback to investigate learning effects.

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## THE EFFECTS OF INFORMATION LOAD AND INFORMATION DIVERSITY ON DECISION QUALITY IN A STRUCTURED DECISION TASK\*

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### Abstract

The major objective of this research was to study the effects of information load and diversity on decision quality in a structured decision task. The concept of information load was subdivided into the concepts of (1) quantity of repeated dimensions and (2) quantity of different dimensions. The latter concept was called information diversity. Two other independent variables studied were task learning and decision experience. Decision quality was operationalized to decision accuracy and time. It was hypothesized that the relationship between the quantity of repeated dimensions and accuracy would be an inverted U curve, and that repeated dimensions and time would produce a U curve. The initial rise in the accuracy curve and fall in the time curve did not occur in the results but the remainder of the curves were largely supported. There were exceptions, however, that require further investigation. It was further hypothesized that higher diversity would result in lower accuracy and higher time, and that higher learning and experience would both result in higher accuracy and lower time. These hypotheses were also largely supported by the results. Again there were exceptions that require clarification. The results also showed a number of interesting interactions between variables. The practical implications of these findings for accounting and information systems were outlined.

Research has shown that information load affects human information processing.<sup>1</sup> Since decision quality is a result of human information processing, this research suggests that information load may have an effect on decision quality. The accountant can vary information loads for decision makers by aggregation, summarization, and the use of models, exception reporting, explanatory footnotes and multiple reports. Hence, if it is assumed that accountants are interested in the decision quality resulting from the information they produce, they should be interested in the effects of information load. Shields (1983, p. 288) supports this contention when he argues that "research on whether the supply of information [information load] ... affects judgment ac-

curacy is important because it provides insight into how accountants can help improve managers' performance." It is argued later in this paper that information diversity should have a similar effect on decision quality to information load. When accountants vary information load in practice, information diversity is generally varied at the same time. Hence they should also be interested in the effects of information diversity.

A number of accounting and information systems researchers have studied information load, and some, while they may not have actually used the term, have also indirectly studied information diversity. However, a review of these studies later in the paper shows that they all contain important problems with the result that

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<sup>1</sup> For example, Schroder *et al.* (1967); Newell & Simon (1972).



their findings are inconclusive.<sup>2</sup> This lack of knowledge in an area important to accountants represents the motivation for this research. The remainder of this first section of the paper discusses the general nature of the decision-making task used in the research and the variables studied. The following sections discuss: empirical research by accounting and systems researchers, research hypotheses, method, results, discussion and conclusion.

In research on information load and diversity it is important that the nature of the decision task be specified. This is because Libby & Lewis (1977) and Schroder *et al.* (1967) point out that the effects of load on decision quality may vary with context. The effects of diversity may also vary with context. The research in this paper uses a well-structured task. An algorithmic decision process is required. Mason & Mitroff (1973) consider the structured/unstructured decision continuum to be most important. Structured decisions are common in practice particularly at the operational control level of management. For example, inventory control and credit control decisions are well structured.

The major independent variables studied in this research are information load and diversity. The nature of these variables requires clarification. Information load has most commonly been measured in the literature (e.g. Schroder *et al.* 1967; Streufert, 1973) in terms of number of information inputs or cues provided to a decision maker. In all the accounting, systems and consumer literature with which the author is familiar, the information inputs were quantitative, and consequently information load was measured in terms of the number of values (i.e. numbers) provided to a decision maker. Information load is so measured in this research.

If a decision maker has a number of cues (i.e. an information load) to make a decision with,

some of these cues may represent different dimensions and some may be repeated dimensions. For example, assume the following cue set:

| Time (years)    | 0       | 1     | 2     | 3     | 4     |
|-----------------|---------|-------|-------|-------|-------|
| Cash flow       | -10,000 | 3,200 | 3,000 | 2,800 | 2,700 |
| Cost of capital | 10%     |       |       |       |       |

Here there are eleven cues (five time periods, five cash flows, and one cost of capital), but there are only three dimensions (time, cash flow and cost of capital).<sup>3</sup> Eight of the cues are repeated dimensions — after the initial time and cash flow there are four more repetitions of each of these dimensions. Cognitively, it would seem that the three dimensions of time, cash flow and cost of capital would be quite different for a decision maker. However, this would not seem to be the case for the five cash flows (or five time periods). It would seem that cognitively a decision maker would not see the five cash flows as five different dimensions, but as one dimension (cash flow) with five different values. This would be so regardless of whether the values were independent or not. It is hypothesized here that once a decision maker has conceived of one cash flow, it is much easier for him/her to conceive of four additional values of that dimension, than it is to conceive of four entirely different dimensions (e.g. cost of capital). The same argument applies to the time dimension. Consequently in this research, the concept of information load will be divided into two concepts: (1) the quantity of different dimensions, and (2) the quantity of repeated dimensions. Thus in the above example, the ten time and cash flow cues will be regarded as two different dimensions (time and cash flow) and eight repeated dimensions — after the initial

<sup>2</sup> Information load has also been studied in the consumer research literature e.g. Jacoby (1974, 1974-5). However, problems also exist in that literature e.g. see Wilkie (1974).

<sup>3</sup> This assumes each type of variable is a different dimension. Factor analysis should be carried out to see if this assumption is correct. If factor analysis showed, for example, that two variables were only one dimension, then the two variables would be regarded as one dimension and one repeated dimension.

time and cash flow there are four more repetitions of each of these.

The number of different dimensions in a cue set is the absolute diversity of the set (in the above example absolute diversity is three). Relative diversity is the number of dimensions divided by the number of cues (3/11 or 27.3% in the example). The quantity of repeated dimensions is the number of cues less the number of dimensions (eight in the example).

The author believes that information diversity and the quantity of repeated dimensions (hereafter called Rpt Dims) warrant separate study. *A priori* it seems that they may have different effects e.g.  $n$  different dimensions may be harder to process than  $n$  repeated dimensions. Schroder *et al.* (1967) argue that information diversity should be studied although they do not clarify what they mean by the concept.

Rpt Dims and information diversity are studied in this research in conjunction with two other independent variables — decision-making experience and decision-task learning. Harvey *et al.* (1961) have found that decision makers can learn to process higher loads. Decision-making experience and task learning are two different types of learning. Experience is a general type of learning, covering learning through experience over a range of decision tasks. Task learning is a specific type of learning, covering learning within the particular decision task. The expert systems literature (e.g. Chase & Simon, 1973; Hayes-Roth *et al.* 1983) also supports the study of experience and task learning. This literature reports that experts generally behave differently from novices. One way experts become expert is through experience and learning. The experience variable will also provide some evidence on the issue of whether students are good surrogates for experienced decision makers. The low experience subjects were full time students.

The dependent variables in this research are decision accuracy and time. These are two dimensions of decision quality in business decision-making. In the decision task used, there was a correct answer to each decision, and consequently decision accuracy could be determined. Decision time has an opportunity cost in

practice, since faster decision-making enables managers to move on to other revenue producing activities.

## EMPIRICAL RESEARCH IN ACCOUNTING AND INFORMATION SYSTEMS

To this writer's knowledge no other research has investigated the separate effects of information diversity and Rpt Dims. However, there are a number of papers in the general area of empirical research on information load in accounting and information systems.

Some of these are not relevant to this paper. There are two reasons:

(1) Some (Driver & Mock, 1975; Pratt, 1982; McGhee *et al.*, 1978; Benbasat & Dexter, 1982) have studied individual differences which are not the concern of this paper. Lewis (1984) supports the approach taken here when he states:

The overwhelming evidence to date is that information structures affect performance, that cognitive characteristics do not affect performance and that information structures and cognitive characteristics do not interact with respect to performance.

Diversity and Rpt Dims are aspects of information structure.

(2) Shields (1980), Snowball (1980), and Shields (1983) have studied the effects of load on dependent variables other than the ones studied here (decision accuracy and time).

Some researchers (Barefield, 1972; Abdelkhalik, 1973; Chervany & Dickson, 1974; Benbasat & Dexter, 1979; Mock & Vasarhelyi, 1984) have studied information load indirectly in the process of studying other aspects of information structure, e.g. aggregation. Since these studies were not really interested in investigating information load it should not be surprising that in all cases load has been confounded with other variables. The confoundings are similar to those in the Casey (1980) research which will be reviewed shortly. Because of these confoundings the above papers add little to our knowledge

about information load. Consequently, they will not be discussed further.

There are two papers which directly study the effects of information load on decision quality — Casey (1980) and Shields (1983). The Shields research uses a very similar task to that used by Jacoby (Jacoby *et al.*, 1974; Jacoby *et al.*, 1974–5; Jacoby, 1977) in the consumer area and seems to build on that earlier work. However, Wilkie (1974) has noted that the Jacoby research is problematic and Shields (1983) seems to inherit some of these deficiencies. The Casey (1980) research is also problematic. The major problem with the Casey (1980) and Shields (1983) papers is that they have confounded extraneous variables with their independent variables. Since the confoundings in both papers are similar, for brevity, only the Casey (1980) paper will be reviewed.

Casey (1980) manipulated load over three levels. The low load group received six ratios for three years for a number of firms 50% of which had gone bankrupt. The moderate load group received these ratios plus balance sheets and P & L statements. The high load group received the previous information plus notes to the statements. Dependent variables were bankruptcy-prediction accuracy and decision time. The results were: the moderate group predicted significantly better than the low group and did not spend more time; the high group spent significantly more time than the moderate group and did not predict more accurately.<sup>4</sup>

Unfortunately, Casey (1980) seems to confound four other variables with information load — irrelevant data; uncertainty; diversity and Rpt Dims; and information value. It is probable that as load increases, irrelevant data would increase, uncertainty would change, and the number of different dimensions (diversity) and Rpt Dims

would both change. The information value confounding is less obvious requiring greater explanation. As information load increased in Casey's experiment so probably also would the value of the information. These two effects (load and value) are confounded together. The load effect is of a cognitive psychological nature. It is due to the inability of humans to process high volumes of information. This effect will be discussed in more detail later in the paper. Information value is the added profits due to the information resulting in better decision making. Information can be valued using a statistical mathematical calculation described by the American Accounting Association (1969), or Cook & Russell (1981). This confounding of load and value is common in accounting/information systems research where profit is normally a dependent variable (e.g. the problem also exists in Schroeder & Benbasat, 1975). It is important that these two effects be untangled because they will probably be very different and their relative strengths may vary from decision to decision. If they are confounded together we will not be sure how much of the overall effect is due to load and how much is due to value. Permitting them to remain confounded in future experiments would be a likely cause of inconsistent results. These confoundings in the Casey (1980) research reduce somewhat the extent to which his findings add to our knowledge about information load.

A review of the *results* from accounting and information systems research into information load shows that they are rather *inconsistent*. This could be due to the confounding variables noted, which could be present to different degrees in each study. This author believes that it is time to try to achieve greater control in research in this area, even if this is initially at the expense of some external validity. This approach is taken

<sup>4</sup> Casey's findings are different from those obtained here. Casey found that as load increased, accuracy performance rose and then levelled out, and time performance (time performance is inversely related to time) was level initially and then declined. In the research in this paper, both accuracy and time performance were level initially and then declined. A further difference between the findings here and Casey's, is the cue level at which time performance started to decline. Here time performance started to decline at fifteen cues. In Casey's findings, time performance did not decline until well in excess of this number of cues. These differences between the findings in this research and Casey's may be due to the confounding variables in the latter.

in this paper. A prime objective here is greater control over the experimental task in order that confoundings might be eliminated.

### RESEARCH HYPOTHESES

There are a number of ways that information diversity and the quantity of Rpt Dims might be studied. They are studied in this research as follows:

(1) *Rpt Dims* is manipulated over a number of levels holding absolute diversity constant. Thus the effects of Rpt Dims are studied unconfounded by absolute diversity (the number of dimensions).

(2) *Relative diversity* within a *constant cue set size* is studied by holding the number of cues constant and varying relative diversity. In other words, within a constant cue set size, *different* dimensions are substituted for an equal number of *repeated* dimensions (and vice versa) and the effects noted.

(3) The interaction of (1) and (2) is studied in a factorial design.<sup>5</sup>

Hypotheses about the main effects of Rpt Dims and relative diversity will be derived from the research in psychology of Schroder *et al.*<sup>6</sup> and Berlyne (1960). Research in accounting, information systems, and the consumer area is too problematic to be used for this purpose (see earlier review). Unfortunately, existing theory and findings are insufficient to enable hypotheses about interaction effects. Caution must be

exercised in generalizing from psychological research to the managerial decision-making domain studied here. Consequently, *undue* precision should not be attributed to the hypotheses advanced below for testing purposes.

Two Rpt Dims hypotheses are as follows:

H1. If Rpt Dims is plotted on the *X* axis and accuracy on the *Y* axis an inverted U curve will result.

H2. If Rpt Dims is plotted on the *X* axis and time on the *Y* axis a U curve will result.

The initial rise (fall) in the H1 (H2) curve is predicted by the Berlyne (1960) model which argues that subjects are bored with simple tasks and consequently decision performance suffers (i.e. accuracy is lower and time higher than for moderately complex tasks). This will be called the boredom effect. This research especially includes an extra low Rpt Dims level to test the boredom effect (see Table 2, Rpt Dims level 0). The author believes this extra low level will produce a sufficiently simple task to generate the boredom effect. The initial rise (fall) in the H1 (H2) curve should be less steep than the initial rise in the curve in the Schroder *et al.* model. This is because there are two reasons the Schroder *et al.* curve rises and only one of these is present in H1 and H2. The reason existing in all cases is the boredom effect. The second reason the Schroder *et al.* curve rises is as follows. The Schroder *et al.* model has a number of differentiations and integrations on the *Y* axis, and environmental complexity on the *X* axis, with the latter variable being operationalized to num-

<sup>5</sup> In this approach, absolute diversity (with Rpt Dims held constant) is not studied directly. The task used in this research did not lend itself to varying absolute diversity holding Rpt Dims constant. However, its effects may be assessed indirectly. For example, assume a load of nine cues (5 dimensions/4 repeated dimensions) is increased to 14 cues (10 dimensions/4 repeated dimensions). The effects of this increase in absolute diversity may be estimated from the knowledge gained in this experiment in a two-step process:

(1) The effects of an increase to 14 cues (5 dimensions/9 repeated dimensions) could be estimated from our knowledge from (1) above.

(2) The effects of a change in relative diversity from 14 cues (5 dimensions/9 repeated dimensions) to 14 cues (10 dimensions/4 repeated dimensions) could be estimated from our knowledge from (2) and (3) above.

<sup>6</sup> Schroder *et al.* (1967); Streufert & Streufert (1969); Streufert (1970); Streufert (1972); Streufert, S. C. (1972); Streufert, S. C. (1973).

ber of cues. The curve rises because a moderate number of cues permits a higher number of differentiations and integrations than a low cue level. However, this does *not* tell us that the *necessary* differentiations and integrations *cannot* be carried out at low cue levels. Hence it does not tell us what will happen when accuracy or time are substituted on the Y axis.

There are two reasons for the fall (rise) in the *H1* (*H2*) curve — (1) the Berlyne model argues that when the task becomes more complex subjects tend to panic, and (2) the Schroder *et al.* model argues that when the number of cues is high, subjects are cognitively unable to carry out the necessary differentiation and integration of cues to process the information. Both reasons predict lower accuracy and higher time for high Rpt Dims levels than for intermediate levels (increasing Rpt Dims, (1) increases task complexity and (2) increases the number of cues).

One issue about *H1* (*H2*) remaining to be considered is the Rpt Dims level of the point of maximum (minimum) height. The only evidence available on this issue is the consistent finding in the Schroder *et al.* research that their curve peaked at ten cues of diverse information (Streufert, 1973). Table 2 shows the number of cues in each Rpt Dims level in this experiment. For Rpt Dims main effects, each Rpt Dims level is an average of the two relative diversity conditions (high and low) at that level. Level 1 (nine cues of high and low relative diversity) should represent a *lower* level than ten cues of diverse information. Level 2 (fifteen cues of high and low relative diversity) will probably represent a *higher* level than the ten cues of diverse information. Hence, the curve in *H1* (*H2*) should peak (bottom out) between Rpt Dims levels 1 and 2. Consequently, the following hypothesis is put forward:

*H3.* The *H1* (*H2*) curve will peak (bottom out) at Rpt Dims level 1 or 2.

The relative diversity hypotheses are as follows:

*H4.* Information of higher diversity will result in lower accuracy.

*H5.* Information of higher diversity will result in higher time.

Schroder *et al.* would argue that relative diversity should produce similar effects to Rpt Dims. In their theory, both are aspects of environmental complexity and all aspects of this concept are hypothesized to produce similar effects. The Berlyne model would also predict that relative diversity and Rpt Dims would produce similar effects (both would be aspects of task complexity). Hence, if relative diversity were manipulated within a constant cue set size (of say 20 cues), from low relative diversity to high relative diversity, then the effects on decision accuracy should be an inverted U curve, and the effects on time should be a U curve (similar to the curves in *H1* and *H2*). However, in this experiment relative diversity has only two levels. Where then on the curves is it predicted these levels will be? In this experiment, relative diversity is manipulated over Rpt Dims levels 1, 2, 3 and 4, (see Table 2) and the number of cues involved must be taken into account. Ten cues of high diversity is the point at which the curve in the Schroder *et al.* model peaks. Hence, Rpt Dims level 1/high diversity (nine cues of high diversity — see Table 2) should be near the maximum (minimum) point of the accuracy (time) curve, and Rpt Dims levels 2–4/high diversity should be on the downward (upward) slope. Rpt Dims levels 2–4/low diversity should result in improved decision making over the corresponding high diversity levels i.e. there should be a move back up the accuracy curve and back down the time curve. Rpt Dims level 1/low diversity should result in lower decision quality than for Rpt Dims level 1/high diversity i.e. Rpt Dims level 1/low diversity should result in a move back down (up) the accuracy (time) curve towards the boredom effect. Since for three levels, low diversity results in higher decision quality (higher accuracy, lower time) than high diversity, and the reverse is only true for one level, the overall main effect for relative diversity (over all four Rpt Dims levels) should be lower relative diversity resulting in higher accuracy and lower time (hence *H4* and *H5*).

Harvey *et al.* (1961) have found that subjects can *learn* to process higher environmental complexity. The finding is that subjects with higher learning process more cues at all levels of environmental complexity (Rpt Dims and information diversity are two major elements of environmental complexity). It is assumed here that the higher the amount of information processed the higher the resulting decision quality. Since decision-making experience and decision-task learning are two different types of learning the argument here leads to the following hypotheses:

- H6. Higher experience should result in higher accuracy.
- H7. Higher experience should result in lower time.
- H8. Higher task learning should result in higher accuracy.
- H9. Higher task learning should result in lower time.

## METHOD

### *Subjects*

Seventy-one subjects with practical decision-making experience and 79 subjects without decision-making experience were used. The experience of the former group ranged from 6 months to 25 years with a mean of 7.5 years. Subjects were full-time and part-time students in an advanced undergraduate course in the Department of Commerce at the University of Queensland, Australia. Zimmer (1980) has found that students with practical decision-making experience are good surrogates for decision makers in practice.

### *Design*

A  $4 \times 2 \times 2 \times 4$  factorial design was used where there were: (1) four levels of Rpt Dims, (2) two levels of relative diversity, (3) two levels of decision-making experience, and (4) four levels of decision-task learning. Decision-task learning

was a repeated measures factor. In addition, an *extra low* Rpt Dims/low relative diversity/low experience condition<sup>7</sup> (with four learning levels) was created to enable the study of very low Rpt Dims levels.<sup>8</sup> In the following discussion Rpt Dims levels will be coded from 0 to 4 where 0 is the extra low level and 4 the highest. Subjects in the two decision experience groups were randomly assigned to the remaining between subject variable levels.

### *Experimental task*

This section discusses in turn (1) the general nature of the experimental task, (2) the manner in which the independent and dependent variables were operationalized, (3) the manner in which extraneous variables, which have been confounded in prior research, were controlled, and (4) the reliability and face validity of the task.

*General nature of the task.* The aim in constructing the task was to produce a reasonably realistic structured decision-making task. Subjects were required to decide if they would accept or reject a capital investment opportunity and provide the numerical justification for their decision. The information relevant for the decision was provided in an information sheet. An example is given in the Appendix. The information sheets for the nine different diversity/Rpt Dims conditions were identical except for the tables contained therein. There was a different type of table for each diversity/Rpt Dims condition.

The Appendix includes a table for a low diversity condition. Table 1 illustrates a high diversity table. The differences between these tables will be explained in detail below.

To perform the experimental task subjects needed knowledge of a discounted cash flow/cost volume profit algorithm. All subjects were familiar with and used this type of algorithm.

<sup>7</sup> The *high* diversity, low Rpt Dims condition had only one year of revenues and costs. It was not possible to have anything less than this to produce an extra low Rpt Dims/*high* diversity condition. Unfortunately there were insufficient subjects with high experience to have a *high* experience group.

<sup>8</sup> Care was taken in analyzing the results of this group. It was compared only with other low diversity/low experience groups.

TABLE 1. Table from information sheet (high relative diversity/Rpt Dims level 3 condition)

| Time |                        | Beginning of year 1 | End of Year |        |        |
|------|------------------------|---------------------|-------------|--------|--------|
|      |                        | \$                  | 1           | 2      | 3      |
| Item | Cash outlay            | 8497                |             |        |        |
|      | Revenue                |                     |             |        |        |
|      | Sales volume           |                     | 132         | 154    | 175    |
|      | Sales price            |                     | 461         | 473    | 486    |
|      | Costs                  |                     |             |        |        |
|      | Variable cost per unit |                     | 243         | 249    | 253    |
|      | Fixed cost             |                     | 25,498      | 31,098 | 37,620 |

Subjects were provided with a present value ( $V_{nr}$ ) table as required by the algorithm. It is argued here that the experimental task is representative of a structured decision-making task. Davis & Olson (1986, p. 33) describe a structured decision as follows:

an organization can prepare a decision rule or decision procedure. . . . The decision procedure will also specify the information to be acquired before the decision rules are applied.

The task used here has a clear cut decision procedure which specifies the information required. The face validity results to be presented later indicate that subjects saw the task as representative of structured decision tasks in practice.

Table 1 and the Appendix show that the information sheets provide subjects with a matrix of quantitative information. In these information matrices, the columns represent time, and the rows information item (i.e. cash/revenue/cost item). This provision of information in matrix form is similar to the approach used by Jacoby *et al.* (1974, 1974-5) in the consumer area, and by Shields (1983) in accounting. Like Jacoby *et al.* (1974, 1974-5) and Shields (1983) this research manipulates the rows and columns in operationalizing independent variables. How-

ever, Jacoby and Shields confound the row and column manipulations together. Wilkie (1974) is critical of Jacoby in this regard. In the research in this paper row and column manipulations are not confounded together — columns are manipulated to operationalize Rpt Dims and rows to operationalize information diversity. These two manipulations are carefully separated. This is described in more detail below.

*Operationalization of variables.* Both Rpt Dims and information diversity were operationalized by manipulating quantitative cues.<sup>9</sup> The algorithm appropriate for the decision task used here processed only quantitative cues. Rpt Dims was operationalized by varying the number of years over which revenues were received and costs expended i.e. by manipulating the number of columns in the tables in the information sheets. Details of Rpt Dims levels and the corresponding number of years of revenue and cost are as follows:

| Rpt Dims level | Number of years of revenue and cost |                |
|----------------|-------------------------------------|----------------|
|                | Low diversity                       | High diversity |
| 0              | 1                                   | N/A            |
| 1              | 2                                   | 1              |
| 2              | 4                                   | 2              |
| 3              | 6                                   | 3              |
| 4              | 8                                   | 4              |

Table 2 shows the number of quantitative cues

<sup>9</sup> Care was necessary in selecting numbers for inclusion in the tables in the information sheets. A rule governing the size of numbers was necessary because Miller (1956) and others have shown that short-term memory for digits for most subjects is in the range  $7 \pm 2$ . The rule used here was that all numbers should be between three and five digits and that the mean size for any table should be four. This should prevent subjects having short-term memory problems.

which this manipulation produces for each level. When the number of years of revenue and cost is increased, Rpt Dims increases but absolute diversity does not. The additional cues involve the same dimensions as cues provided at lower Rpt Dims levels. No new dimensions are involved and thus absolute diversity remains constant. This can be seen more clearly by reference to Table 2. Taking the high diversity condition, the information supplied for level 1 Rpt Dims contains eight dimensions (cost of funds, cash outlay, points of time, sales volume, price, variable costs, fixed costs, and present value factors). As Rpt Dims is increased within the high diversity condition the dimensions remain the same, but the number of values of some of the dimensions increases. For example, as we move from level 1 to 2, the number of fixed and variable cost values increases from two to four, but the number of dimensions remains two. A similar situation exists within the low diversity condition. The introduction stated that this experiment would vary Rpt Dims holding absolute diversity constant. This has been accomplished i.e. by holding the dimensions constant as Rpt Dims increases.

Information diversity was operationalized by manipulating the rows in the tables in the information sheets. The Appendix contains a table for a low relative diversity condition. Table 1 is for a high relative diversity condition. In the tables, the second column from the left shows the dif-

ference between low and high diversity conditions. In this column, Table 1 contains five elementary items (cash outlay, sales volume, sales price, variable cost and fixed cost), while the Appendix contains only two elementary items (cash outlay and revenue less costs). In this experiment an ordinal measurement of relative diversity is sought. It is assumed the five elementary items in Table 1 involve more dimensions than the two elementary items in the Appendix. The introduction stated that relative diversity will be manipulated within a constant cue set size i.e. the number of cues in the same Rpt Dims level for high and low relative diversity conditions will be equated. Table 2 shows that this has been done.

Task learning was operationalized by having subjects make four decisions in sequence and measuring the dependent variables for each of the four trials. Since Rpt Dims and diversity were between-subject factors, the four decisions made by each subject were all within the one Rpt Dims/diversity condition. Hence there were four information sheets for each Rpt Dims/diversity condition. The four sheets within each condition were identical except for the numbers contained in the tables. The order of the four sheets was randomized for each subject. Task learning was a repeated-measures factor, and was measured by comparing performance over the four trials.

TABLE 2. Number of numerical cues by diversity/Rpt Dims condition

| Item<br>name               | Rpt Dims level |            |             |            |             |            |             |            |             |
|----------------------------|----------------|------------|-------------|------------|-------------|------------|-------------|------------|-------------|
|                            | 0              | 1          |             | 2          |             | 3          |             | 4          |             |
|                            | Low<br>Div     | Low<br>Div | High<br>Div | Low<br>Div | High<br>Div | Low<br>Div | High<br>Div | Low<br>Div | High<br>Div |
| Cost of funds              | 1              | 1          | 1           | 1          | 1           | 1          | 1           | 1          | 1           |
| Cash outlay                | 1              | 1          | 1           | 1          | 1           | 1          | 1           | 1          | 1           |
| Points of time             | 2              | 3          | 2           | 5          | 3           | 7          | 4           | 9          | 5           |
| Revenue less costs         | 1              | 2          |             | 4          |             | 6          |             | 8          |             |
| Sales volume and price     |                |            | 2           |            | 4           |            | 6           |            | 8           |
| Costs (variable and fixed) |                |            | 2           |            | 4           |            | 6           |            | 8           |
| Present value factors*     | 1              | 2          | 1           | 4          | 2           | 6          | 3           | 8          | 4           |
| Total cues                 | 6              | 9          | 9           | 15         | 15          | 21         | 21          | 27         | 27          |

\*The algorithm to process the information correctly included a discounted cash flow calculation. Subjects were consequently provided with a table of four digit present value ( $V_{nr}$ ) factors.



Decision accuracy was measured by grading each decision as correct or incorrect. To be correct, the correct numerical answer *and* accept/reject choice were required. A calculator was provided to assist with the task. This calculator performed only the basic arithmetic computations and did *not* contain discounted cash flow functions. The calculator was provided since it was not intended that the task would emphasize arithmetic ability. DCF functions were not provided since subjects were required to process data through that algorithm themselves. All subjects were familiar with the algorithm appropriate for the task. However, they could make errors in recalling the algorithm and in processing the data through it i.e. in combining the values as required by the algorithm. The results show that subjects did make errors in performing the task.

Decision time was measured with a stop watch. Subjects were aware of the watch and this may have created time pressure. Time pressure often exists in decision-making in practice. Care should be exercised in generalizing the results obtained here to situations where time pressure does not exist. Reading time subsequently was subtracted from each decision time because this research is interested in information processing time, not reading time. In general the procedure was as follows. Different subjects (from this experiment) were used to establish average reading times for each experimental condition. Five subjects were assigned to each Rpt Dims/diversity/experience condition, and the average reading time for each learning condition within each of these conditions was found. This time was then subtracted from the decision time for each subject in that condition.

*Control of extraneous variables.* The task used here eliminates the confoundings found in earlier research. Rpt Dims and information diversity are not confounded together because they are included here as separate independent variables. The irrelevant data confounding is eliminated. No irrelevant data are supplied. The

uncertainty confounding does not arise because the information sheet advises subjects to ignore this problem.<sup>10</sup>

The information value confounding is eliminated as follows. Casey (1980) increased load by supplying subjects with additional information for making the *same* decision as for the low load condition. This additional information had value, and load and value were thereby confounded. Here a different approach is taken. Here Rpt Dims is increased by having higher level subjects make a *different* decision from lower level subjects. These decisions are essentially the same except that the higher level decision requires extra information to make a decision of equal quality (i.e. accuracy) to the low level decision. The information value confounding is thereby eliminated. For example if we compare Rpt Dims level 1 with level 2 in the low diversity condition (see Table 2), we see that they both involve the same information dimensions (cost of funds, cash outlay, points of time, revenue less costs, and present value factors). However, level 1 has three points of time, two revenue less costs, and 2 present value factors, whereas level 2 has five, four and four respectively. The six additional values in level 2 must be processed to produce a decision of equal accuracy to level 1. Unlike for Casey, Rpt Dims is *not* increased by providing additional information which helps us make the *same* decision *better*. Instead, Rpt Dims is increased by having *different* decisions with extra information having to be processed in the higher level to produce a decision of equal accuracy to the lower level. Shields (1983) also controls information value in this way. Some may argue that this method of eliminating the information value confounding results in a task confounding. However, this is unlikely to be the case. The task taxonomy literature (e.g. Fleishman, 1982) suggests that a confounding would only arise if the different decisions were in different task *classes*. The decisions in this research are so similar it is unlikely

<sup>10</sup> Although subjects were advised to ignore uncertainty, they may have been unable to do so psychologically. It may have been a good idea to have subjects rate the uncertainty they experienced to see if they were able to comply with the instruction. This was not done. It was assumed subjects could comply with the directive.

they would be in different task classes, and hence it is unlikely a task confounding exists. For example in the illustration earlier in this paragraph, Rpt Dims levels 1 and 2 involve the same algorithm and the same information dimensions are used in the algorithm. Level 2 merely has six additional values of the same dimensions. It is therefore most likely the tasks in levels 1 and 2 would be in the same task class.

**Reliability and face validity.** Reliability indicates if the results are stable. This is important if we are to be confident of replicating results. Validity is important if we are to be confident that the operationalizations actually capture the theoretical variables. Reliability was measured using Cronbach's (1970) coefficient Alpha. In the higher diversity condition the coefficient was 0.93 for accuracy and 0.72 for decision time. In the low diversity condition it was 0.62 for accuracy and 0.81 for time. These coefficients are satisfactory by conventional standards (see Nunnally, 1970). Face validity was measured by having subjects rate on a seven point scale (1 = very unreasonable; 7 = very reasonable) the degree to which they believed the experimental task represented practical decision making of a structured type. Dubin (1978) argues that validity can only be measured in a judgmental fashion such as this. He is highly critical of criterion measures of validity. The mean rating was 4.86 which is on the reasonable side of the scale. This rating is regarded here as satisfactory.

## RESULTS AND DISCUSSION<sup>11</sup>

The main effects for Rpt Dims, diversity, and experience on decision accuracy were analyzed using Chi Square. Because Chi Square requires observations to be independent (Siegel, 1956), the results for each learning level were analyzed separately. Chi Square analysis may be extended to investigate multiple contingency, which is analogous to interaction in ANOVA. Sutcliffe

(1957) describes this analysis and it is used here. Learning main effects were analyzed using the McNemar test (Siegel, 1956). Interaction between learning and the other three independent variables was investigated using Friedman two-way analysis of variance (Siegel, 1956).

Table 3 shows the main effects for experience, diversity and Rpt Dims on accuracy which are significant or approach significance. In the Rpt Dims results, there are no significant differences between level 0 and the corresponding level 1 group, at any learning level. In the comparison of levels 1, 2, 3 and 4, it was necessary to combine 1 with 2 and 3 with 4 because of the Chi Square requirement that fewer than 0.2 of cells have an expected frequency of less than five (Siegel, 1956, p. 178). In the combined data there are no significant differences at learning levels 2, 3 or 4. However, there is a significant difference at learning level 1 (see Table 3). Accuracy is greater at the lower Rpt Dims level ( $\chi^2 = 4.28$ ; d.f. = 1;  $p < 0.05$ ). Figure 1 shows this Rpt Dims effect in graphical form. The only part of hypothesis *H1* that does not occur in Fig. 1 is the initial rise in the curve (the boredom effect). In the development of *H1*, it was argued that its curve would rise less steeply than the curve in the Schroder *et al.* model. Consequently, the failure of the curve to rise was at least partly anticipated. It seems that the boredom effect may occur only in extremely simple tasks. The point at which the curve in Fig. 1 starts to decline (Rpt Dims levels 1 and 2) is predicted by hypothesis *H3*. Note however, that the Rpt Dims effect occurs only at learning level 1. Learning eliminates the effect after only one learning trial. This strong learning effect will be seen in the learning results below.

The relative diversity effect on accuracy is largely as hypothesized in *H4* (see Table 3). Low relative diversity decisions are significantly more accurate than high diversity decisions at learning levels 1 ( $\chi^2 = 4.33$ ; d.f. = 1;  $p < 0.05$ ), and 3 ( $\chi^2 = 6.63$ ; d.f. = 1;  $p = 0.01$ ). At learning level 2 there is a trend towards the same type of

<sup>11</sup> Because it was not possible to hypothesize interaction effects, these will not be discussed in detail. Interactions in the accuracy results will not be discussed unless they occurred at more than one learning level or unless similar effects occurred in the time results.

TABLE 3. Accuracy main effects for experience, diversity, and Rpt Dims (only effects which are significant or approach significance are shown)

| Main effect | Learning level | Main effect level | Frequencies and (percentages)* |           | Totals† | Significance (p) |
|-------------|----------------|-------------------|--------------------------------|-----------|---------|------------------|
|             |                |                   | Correct                        | Incorrect |         |                  |
| Experience  | 1              | Low experience    | 35 (49)                        | 36 (51)   | 71      | <0.05            |
|             |                | High experience   | 49 (69)                        | 22 (31)   | 71      |                  |
|             | 3              | Low experience    | 45 (63)                        | 26 (37)   | 71      | <0.01            |
|             |                | High experience   | 60 (85)                        | 11 (15)   | 71      |                  |
|             | 4              | Low experience    | 50 (70)                        | 21 (30)   | 71      | 0.075            |
|             |                | High experience   | 60 (85)                        | 11 (15)   | 71      |                  |
| Diversity   | 1              | Low diversity     | 48 (69)                        | 22 (31)   | 70      | <0.05            |
|             |                | High diversity    | 36 (50)                        | 36 (50)   | 72      |                  |
|             | 2              | Low diversity     | 59 (84)                        | 11 (16)   | 70      | 0.13             |
|             |                | High diversity    | 52 (72)                        | 20 (28)   | 72      |                  |
|             | 3              | Low diversity     | 59 (84)                        | 11 (16)   | 70      | 0.01             |
|             |                | High diversity    | 46 (64)                        | 26 (36)   | 72      |                  |
| Rpt Dims    | 1              | 1 & 2             | 47 (67)                        | 23 (33)   | 70      | <0.05            |
|             |                | 3 & 4             | 37 (51)                        | 35 (49)   | 72      |                  |

\* Percentages are row percentages and are in brackets.

† There were eight or nine subjects per cell (resulting totals are 70, 71 and 72).

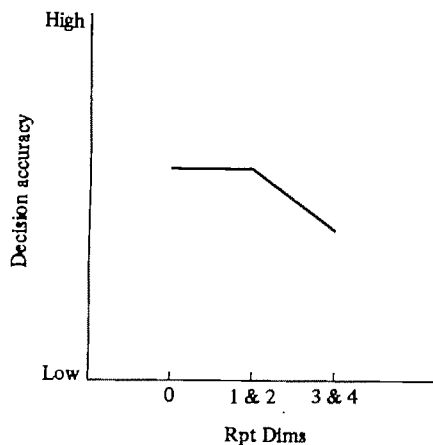


Fig. 1. Relationship between decision accuracy and Rpt Dims at learning level 1.

effect ( $\chi^2 = 2.36$ ;  $d.f. = 1$ ;  $p = 0.13$ ). Low diversity decisions are also more accurate at learning level 4 (80% vs 75%) but the differences in this case do not approach significance. It seems that learning has eliminated the relative diversity ef-

fect. Note that it has taken learning longer to eliminate the diversity effect (four levels) than the Rpt Dims effect (two levels). It seems that the diversity effect may be stronger.

The hypothesized learning effect on accuracy ( $H_8$ ) has occurred from learning levels 1 to 2 (learning has produced more accurate decisions), but there are no significant learning effects at levels 3 and 4. Table 4 shows the data from levels 1 and 2 cast in the form required by the McNemar test. The table reveals that 22% changed from incorrect in trial 1 to correct in trial 2, while only 3% changed in the reverse direction. This indicates significant learning ( $\chi^2 = 19.31$ ;  $d.f. = 1$ ;  $p < 0.001$ ).

Experience main effects on accuracy are largely as predicted by  $H_6$  (see Table 3). High experience subjects are significantly more accurate at learning levels 1 ( $\chi^2 = 4.93$ ;  $d.f. = 1$ ;  $p < 0.05$ ), and 3 ( $\chi^2 = 7.16$ ;  $d.f. = 1$ ;  $p < 0.01$ ). They are close to significantly more accurate at learning level 4 ( $\chi^2 = 3.27$ ;  $d.f. = 1$ ;  $p = 0.075$ ). At learning level 2, high experience subjects are

more accurate, but the differences are not significant (82% vs 75%).

TABLE 4. Changes in the accuracy of subjects' decisions from learning trial 1-2

|                  |           | Learning level 2 |           | Totals |
|------------------|-----------|------------------|-----------|--------|
|                  |           | Correct          | Incorrect |        |
| Learning level 1 | Correct   | 80 (56)          | 4 (3)     | 84     |
|                  | Incorrect | 31 (22)          | 27 (19)   | 58     |
| Totals           |           | 111              | 31        | 142    |

Figures not in brackets are frequencies; figures in brackets are percentages of the grand total.

This table shows the *changes* in accuracy from learning trial 1 to 2. For example: 56% of subjects were correct in both trials; 19% were incorrect in both trials; 22% were incorrect in trial 1 but correct in trial 2; 3% were correct in trial 1 but incorrect in trial 2.

Extended Chi Square analysis found two significant interactions in the accuracy results. These are shown in Table 5 and are as follows. (1) At learning level 1, Rpt Dims and diversity interact. Accuracy is relatively much less for the high Rpt Dims/high diversity condition (i.e. the effects of the two variables together are greater than additive) ( $\chi^2 = 3.8$ ;  $d.f. = 1$ ;  $p = 0.05$ ). However, learning eliminates this effect in that it does not occur at learning levels 2, 3 or 4. It will

be seen below that a similar interaction occurs in the time results. (2) At learning level 2, Rpt Dims and experience interact. High experience subjects are relatively less accurate at the lower load ( $\chi^2 = 5.25$ ;  $d.f. = 1$ ;  $p < 0.05$ ). This effect was not hypothesized and requires replication before emphasis can be placed upon it.

Friedman two-way analysis of variance found no significant interactions between learning and the other three independent variables. However, the above discussion shows that learning did interact with Rpt Dims and information diversity in that it reduced their initial effects. It seems the Friedman analysis was insufficiently sensitive to pick up these interactions.

Decision time results were analyzed using ANOVA.<sup>12</sup> Two ANOVAs were carried out: (1) Rpt Dims levels 1, 2, 3 and 4 were analyzed; (2) Rpt Dims level 0 was compared with the comparable level 1 condition. Analysis (2) was carried out because level 0 was not crossed with two of the other independent variables. The Newman-Keuls test was used for *post hoc* data analysis.

In the level 0/1 comparison the only significant effect was for learning ( $F = 14.473$ ;  $p < 0.0001$ ). There was no significant difference between Rpt Dims levels 0 and 1. Table 6 is the ANOVA table for the level 1, 2, 3, 4 comparison.

TABLE 5. Significant accuracy interactions between Rpt Dims, diversity, and experience

| Effect                | Learning level | Level of interaction variable 1 | Level of interaction variable 2 (Rpt Dims) | Frequencies and (percentages)* |           | Totals† | Significance (p) |
|-----------------------|----------------|---------------------------------|--------------------------------------------|--------------------------------|-----------|---------|------------------|
|                       |                |                                 |                                            | Correct                        | Incorrect |         |                  |
| Rpt Dims X diversity  | 1              | Low diversity                   | 1 & 2                                      | 24 (71)                        | 10 (29)   | 34      | 0.05             |
|                       |                |                                 | 3 & 4                                      | 24 (67)                        | 12 (33)   | 36      |                  |
|                       |                | High diversity                  | 1 & 2                                      | 23 (64)                        | 13 (36)   | 36      |                  |
|                       |                |                                 | 3 & 4                                      | 13 (36)                        | 23 (64)   | 36      |                  |
| Experience X Rpt Dims | 2              | Low experience                  | 1 & 2                                      | 24 (69)                        | 11 (31)   | 35      | <0.05            |
|                       |                |                                 | 3 & 4                                      | 9 (81)                         | 7 (19)    | 36      |                  |
|                       |                | High experience                 | 1 & 2                                      | 29 (83)                        | 6 (17)    | 35      |                  |
|                       |                |                                 | 3 & 4                                      | 29 (81)                        | 7 (19)    | 36      |                  |

\* Percentages are row percentages and are in brackets.

† There were eight or nine subjects per cell (resulting totals were 34, 35, 36).

<sup>12</sup> ANOVA is robust against violations of its assumptions if observations per cell are equal (Edwards, 1972, p. 118). Cells contained eight or nine subjects. Consequently, in cells with nine subjects, one was eliminated using a random procedure.



This shows that all main effects are significant, there are three significant interactions, and there is one trend towards a significant interaction (diversity/Rpt Dims). Table 7 shows the means for significant main effects.

Figure 2 shows the main effect of Rpt Dims on decision time. This figure has been derived from Tables 6 and 7 and Newman-Keuls analysis. There are no significant differences between levels 0, 1 and 2. The time for level 3 is significantly greater, and the time for level 4 is significantly greater again. Figure 2 is largely predicted by *H2* and shows a similar effect to that obtained for accuracy at learning level 1 (see Fig. 1 — time and accuracy are inversely related). The only part of hypothesis *H2* which is not confirmed is the initial fall in the curve. As with accuracy, no boredom effect has been produced. This is further evidence that this effect may occur only in very simple tasks. The curve in Fig. 2 rises at level 2 which is predicted by *H3*. There is one important difference between Figs 1 and 2. The time effects are main effects over all learning levels while the accuracy effects apply only to learning level 1. There is a Rpt Dims/learning interaction in the time results (see Table 6). Newman-Keuls analysis shows that differences due

to Rpt Dims are greater at lower learning levels than at higher levels. Hence, learning reduces the Rpt Dims effect. This interaction was much stronger in the accuracy results where learning *eliminated* Rpt Dims effects after only one learning trial. The interaction between Rpt Dims and learning with *both* dependent variables emphasizes the importance of including learning as a variable in any research in this area.

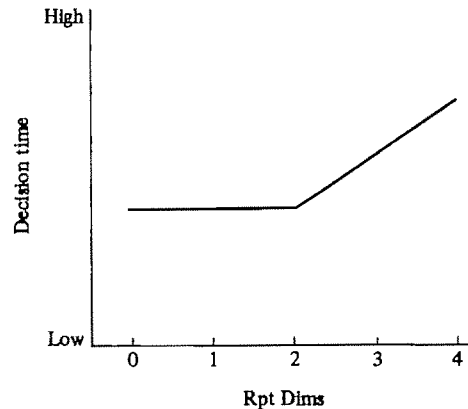


Fig. 2. Main effect of Rpt Dims on decision time.

Table 6 shows a trend toward interaction between Rpt Dims and relative diversity. New-

TABLE 6. ANOVA of decision time for Rpt Dims levels 1-4

| Source                 | S.S.        | d.f. | M.S.        | F       | Probability |
|------------------------|-------------|------|-------------|---------|-------------|
| Between subjects       |             |      |             |         |             |
| (A) Relative diversity | 1438382.000 | 1    | 1438382.000 | 68.537  | 0.000       |
| (B) Rpt Dims           | 1718117.000 | 3    | 572705.660  | 27.289  | 0.000       |
| A×B                    | 130102.000  | 3    | 43367.333   | 2.066   | 0.107       |
| (C) Experience         | 181489.500  | 1    | 181489.500  | 8.648   | 0.004       |
| A×C                    | 94.500      | 1    | 94.500      | 0.005   |             |
| B×C                    | 21143.000   | 3    | 7047.666    | 0.336   |             |
| A×B×C                  | 10023.000   | 3    | 3341.000    | 0.159   |             |
| Error between          | 2350534.000 | 112  | 20986.911   |         |             |
| Within subjects        |             |      |             |         |             |
| (D) Task learning      | 3812590.000 | 3    | 1270863.300 | 379.931 | 0.000       |
| A×D                    | 204185.500  | 3    | 68061.833   | 20.347  | 0.000       |
| B×D                    | 63060.000   | 9    | 7006.666    | 2.095   | 0.029       |
| A×B×D                  | 22352.000   | 9    | 2483.555    | 0.742   |             |
| C×D                    | 33402.000   | 3    | 11134.000   | 3.329   | 0.019       |
| A×C×D                  | 5514.500    | 3    | 1838.166    | 0.550   |             |
| B×C×D                  | 12343.000   | 9    | 1371.444    | 0.410   |             |
| A×B×C×D                | 31862.000   | 9    | 3540.222    | 1.058   | 0.393       |
| Error 2                | 1123914.500 | 336  | 3344.983    |         |             |

man-Keuls analysis shows that the diversity effect is greater at the highest Rpt Dims level, i.e. Rpt Dims and diversity effects are greater than additive. A similar effect occurred in the accuracy results at learning level 1.

TABLE 7. Means for significant main effects on time

| Comparison       | Main effect        | Level | Mean (s) |
|------------------|--------------------|-------|----------|
| Rpt Dims 0 and 1 | Learning           | 1     | 239.76   |
|                  |                    | 2     | 157.73   |
|                  |                    | 3     | 114.03   |
|                  |                    | 4     | 74.74    |
| Rpt Dims 1-4     | Relative diversity | Low   | 208.12   |
|                  |                    | High  | 314.12   |
|                  | Rpt Dims           | 1     | 197.77   |
|                  |                    | 2     | 215.98   |
|                  |                    | 3     | 288.10   |
|                  |                    | 4     | 342.63   |
|                  | Experience         | High  | 242.29   |
|                  |                    | Low   | 279.95   |
|                  | Learning           | 1     | 400.12   |
|                  |                    | 2     | 263.88   |
|                  |                    | 3     | 204.52   |
|                  |                    | 4     | 175.95   |

The effect of relative diversity on time is as hypothesized (*H5*). Table 6 shows a strong main effect. Newman-Keuls analysis shows that diversity effects are significant at all learning levels. There are two interactions involving diversity. A diversity/Rpt Dims interaction was discussed in the previous paragraph. A diversity/learning interaction is also shown in Table 6. Newman-Keuls analysis indicates that time differences due to diversity are greater at learning level 1 than at any other levels. A similar effect occurred with accuracy where learning eliminated the diversity effect at learning level 4. With time, however, learning has merely reduced diversity effects — they are still significant at learning level 4.

The hypothesized effect for learning on time (*H9*) has been confirmed — higher learning results in lower time. Table 6 and the Rpt Dims level 0/1 comparison show strong main effects. Newman-Keuls analysis shows that, with one

exception, significant time differences exist between all learning levels. Table 6 shows three interactions involving learning. Two (diversity/learning; Rpt Dims/learning) have already been discussed. The third (experience/learning) is discussed in the next paragraph.

The hypothesized effects for experience on time (*H7*) have been confirmed — experienced decision makers have taken less time. Table 6 shows an interaction between experience and learning. Newman-Keuls analysis indicates that a significant experience effect occurs only at learning level 1. Learning eliminates the effect.

## CONCLUSION

The foregoing discussion shows that most of the research hypotheses have been confirmed. However, some results were not predicted and these need investigation in future research. Because theory was insufficient to enable predictions about interaction effects all these need further investigation. Unpredicted results that were particularly interesting were the absence of Berlyne's boredom effect in both the accuracy and time results.

Briefly, the hypotheses that were confirmed were as follows. In the accuracy results; Rpt Dims effects (excluding the boredom effect, and at learning level 1 only); diversity effects (at learning levels 1-3); learning effects from levels 1 to 2; and experience effects; were as predicted. In the time results, Rpt Dims (excluding the boredom effect), diversity, learning and experience effects were all predicted. The Rpt Dims level at which the accuracy curve started to fall (nine to fifteen cues), and the time curve started to rise (fifteen cues) was also predicted.

The findings in this research have a number of practical implications. In considering these, note that in practice structured decisions are normally made repeatedly on a periodic basis and hence learning would generally be high. Since learning eliminated the effect of Rpt Dims on decision accuracy and reduced the effect on decision time, the accountant in practice may

not be greatly concerned if the quantity of repeated dimensions is relatively high.<sup>13</sup> There may be no need to use aggregation, models, or exception reports to reduce high levels of Rpt Dims. Similarly, if the use of explanatory footnotes or multiple reports *increases* Rpt Dims, this also may be of no great concern. However, the effect of information diversity (different dimensions) is much stronger than Rpt Dims. Here, the accountant should be more concerned if a decision maker is to be provided with a report containing a high number of different dimensions (information diversity). In this case, consideration may be given to the use of aggregation, models, or exception reporting to reduce the number of dimensions. Also greater concern should be held if the use of explanatory footnotes or multiple reports results in a considerable *increase* in information diversity. More

research findings are necessary to give practitioners more concrete guidelines on these issues.

In addition to the specific suggestions for future research made earlier in this section, this research suggests two more general recommendations for future research into Rpt Dims and diversity. First, it shows the importance of the learning variable. Learning has had main effects on both dependent variables and has reduced and even eliminated some of the effects of other independent variables. Consequently, it is important that learning be included as a variable in all research of this nature. Second, this research shows that inexperienced decision makers are not good surrogates for experienced decision makers. Experience has had significant effects on both dependent variables and has been involved in a number of interactions.

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<sup>13</sup> In this research the maximum number of cues was 27. Care should be exercised in generalizing outside this range.

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### APPENDIX. INFORMATION SHEET (LOW RELATIVE DIVERSITY RPT DIMS LEVEL 3 CONDITION)

Assume you are a decision maker in an organisation and you are in the process of deciding whether your organisation should accept or reject a capital investment opportunity — the acquisition of a new item of plant which will be used to make a new product for sale to customers.

Relevant financial estimates associated with the investment opportunity have been made and are as follows:

| Time | Beginning of       |      |      | End of year |      |      |      |
|------|--------------------|------|------|-------------|------|------|------|
|      | year 1             | 1    | 2    | 3           | 4    | 5    | 6    |
|      | (\$)               | \$   | \$   | \$          | \$   | \$   | \$   |
| Item | Cash outlay        | 9716 |      |             |      |      |      |
|      | Revenue less costs | 1305 | 1624 | 1976        | 2405 | 2973 | 3024 |

#### Notes

- (1) Assume revenue and cost closely approximate cash flows.
- (2) Revenue and costs are shown as being received or paid at the *end* of the year whereas they are in fact received or paid gradually throughout the year. Your organisation has decided to use the "end of year" assumption because it simplifies analysis without introducing significant inaccuracies.
- (3) Ignore problems of risk and uncertainty.
- (4) The cost of funds appropriate to this type of investment is 10% p.a. Assume this will remain constant throughout the life of the project.

#### Required

Using the shortest *valid* method of analysis you know, analyse the investment opportunity and decide whether it should be accepted or rejected.

Calculations to the nearest \$ will be sufficiently accurate. Show your analysis and decision on the facing page.

## PANGLOSSIAN ACCOUNTING THEORIES: THE SCIENCE OF APOLOGISING IN STYLE\*

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### Abstract

Dr Pangloss's comment about, "the best of all possible worlds", is widely remembered, but what we tend to forget is how unpleasant his world really is. *Candide's* life is marred by pillage, murder, rape, war, torture and natural disasters. The only relief Voltaire provides *Candide* after each disaster is a bizarre re-iteration of Pangloss's absurd refrain that, "this must be the best of all possible worlds". Voltaire's *Candide* warns us about scholarly self-deception and wishful thinking. This warning extends to theorizing about large organizations and corporate accountability: that monopolistic and oligopolistic elements may be underplayed; that the disciplining effect of market competition may be overrated; that managerial self-aggrandizement may be idealized as entrepreneurial heroics, and that research may be trivialized in the quest for objective results and tractable theories. This paper uses Agency Theory and Transaction Cost Theory to spell out the dangers of Panglossian theorizing. It rejects the notion that theories are dispassionate reflections of reality; instead, it views them as materialistically grounded in social conflict — as intellectual terrains on which social interests struggle to re-present and control their realities. In focussing on Agency and Transactional Cost Theory, three types of re-presentational distortion are considered here: those emanating from failing to acknowledge the constitutive potential of theorizing (stressing instead its natural and law-like character); those arising from overstating the empirical validity of theories, and those emerging from neglecting the interests that benefit from research. The implications of the paper are analogous to lessons that Voltaire teaches us through Dr. Pangloss: we may pay a high price if we listen to "simplifying assumptions" and "analytic approaches" of the Pangloss's of accounting thought. Their intellectual pollyannaism frequently promotes social causes that, after some reflection, we might prefer to dissociate ourselves from. Only by explicating the social underpinnings of accounting practices — contemporaneously and historically — and by investigating the social allegiances of different forms of theorizing, do we give ourselves the opportunity of such social self-awareness.

Voltaire was, first and foremost, a man of action. Sensitive, emotional, compassionate, irascible and generous, he found his greatest satisfaction and release in his literary work. Once he complained that Rousseau wrote for the sake of writing, while he himself wrote in the interest of action. This remark reflects Voltaire's disdain for scholars who merely meditate and theorize.

Through *Candide*, Voltaire develops a sardonic critique of a certain kind of theorist (Voltaire, 1961). *Candide* is the story of a young servant who was schooled by an eminent philosopher (Pangloss). *Candide* had the misfortune to be caught by his master, fraternizing with the latter's daughter. The master turned *Candide* out of his house, condemning him to roam, pen-

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niless, in a barbaric and hostile world. Candide then proceeded on a series of bizarre and gruesome adventures, armed with little other than Pangloss's philosophy for protection and guidance.

Voltaire uses Candide's adventures to satirize philosophizing that rationalizes (apologizes for) the status quo. His condemnation of Pangloss's "*libido ratiocinandi*" is vividly illustrated in chapter 5 where Candide, lying injured in the ruins of Lisbon after an earthquake, begs Pangloss for oil and wine; and is treated to a theory of the origins of the earthquake. In seeking to direct Pangloss's attention to his immediate plight, Candide's manner becomes conciliatory, yet mildly desperate: "Nothing is more probable, but for the love of God, a little oil and wine".

"What do you mean, probable?" persists the philosopher. "I maintain that the matter is proved." Candide lost consciousness. . . "

*Candide* is a comic tragedy that shows the perils of theorizing that, however bad things are, this is still the best of all possible worlds. Voltaire presents the theorist as ineffectual, and ridicules the notion that theorists can ever be independent, neutral and impartial. Unbridled optimism, passivity and inaction are conservative biases that rendered both Candide and Pangloss impotent when faced with terrifying dangers and catastrophes.

Although *Candide* was written in 1759, its warnings about biases in theorizing resonate with work in today's philosophy and sociology of science. In this modern perspective, "Science" is often seen as an institutional embodiment of partisan values (Ravetz, 1984; Edgley; Rose, 1979; Hirst & Woolley, 1982; Lawler, 1978). Voltaire's proposition, that value imposition is not merely inescapable, but essential, still remains pertinent today.

## DISCOVERY VS INVENTION

While they did not work with Voltaire's texts, several contemporary researchers have effectively refined and updated Voltaire's arguments. They show that the way in which research affects economic and social affairs — through scientific breakthroughs — is as much a process of invention and creation as it is discovery (Allen, 1975; Barnes, 1982). Barnes, in developing from the work of T.S. Kuhn, criticizes the conventional view of science that when something is "discovered", it is assumed to exist empirically, prior to being found. In opposition to this "discovery view", Barnes contends that science plays a constructionist role in the invention of phenomena; that science renders phenomena visible — a view that finds support in other literature (Foucault, 1973, 1980).<sup>1</sup> Barnes contends that an empirical emphasis of knowledge-through-discovery ignores the researcher's agency in discovery, both in introducing a perception needed for recognizing a new phenomenon, and in creating the phenomenon itself.

Barnes uses several examples to develop his thesis that certain scientific perceptions are integral to the process of particular discoveries. Uranus (a pulsar) was first noticed by chance, as a blurred smudge on a chart that recorded the signal from a scanning radio telescope. As no theoretical expectation pointed to the existence of a pulsar, there was considerable pressure to dismiss the reading as a smudge. However calculations were made and vicissitude charts were constructed, to ascertain whether the signal — if it existed — was terrestrial or celestial in origin (Woolgar, 1976). The signal then disappeared and reappeared and calculations, observations and instruments were all rechecked for spurious affects. Eventually, the discovery of a new star was announced, but only after much con-

<sup>1</sup> Foucault (1980) describes how sexuality became a discursive phenomena. From the detailed re-enactment in the confessional, to the Victorian "valorization of the discourse on sex . . . the carefully analytical discourse [that] was meant to yield multiple effects of displacement, intensification, reorientation, and modification of desire itself. . . There was installed . . . an apparatus for producing an ever greater quantity of discourse about sex, capable of functioning and taking effect in its very economy" (p. 23).

troversty and a major cognitive reorientation in the scientific community.

Uranus's early signals were not encodable in the original scientific language. To obtain a collective meaning for the signal, a reconstruction of the language, attitudes, beliefs, perceptions, values and concepts of a scientific community was needed. The example illustrates how a specific discovery may be predicated on certain social, psychological, value and political predispositions; what, in a somewhat different context, Rose calls a "psychological complex" (Rose, 1979).

Barnes' proposition — that science invents as much as it discovers — is developed using examples from natural science. In quoting Kuhn, Barnes cites the discovery of oxygen: Was the gas really discovered by Priestly in 1775 or Lavoisier in 1776, as traditional interpretations would have us believe; or was the first discoverer the first person to create a sample of the gas? If the latter, then Hales (1730) and Bayen (1770) both managed to create oxygen, but both failed to recognize that they had produced a new gas (Kuhn, 1962; Barnes, 1982, p. 42).

The social sciences abound with examples that alert us to ways that science intervenes and reconstitutes the phenomenon it investigates. Linear programming, Keynesian demand management, Freudian psychoanalytical techniques, and nuclear studies are not merely descriptions of reality, but ways of changing it. Description and empiricism may be necessary, but they are rarely sufficient as a rational basis for directing

such activities. Envisaging a world-to-be-created requires transcendental philosophical methods, not an approach that begins and ends with apprehending historical "facts" (Rose, 1979; Held, 1980).

There is a further difficulty associated with empiricism: that the validity of theories is ultimately unresolvable in empirical terms because it is impossible to conclusively prove or refute a hypothesis using empirical data. (Some of the reasons for this are explored below.) Because competing scientific theories are "incommensurable" in this view, empiricist visions, such as Popparian falsificationism (involving scientific progress through a series of confrontations or "crucial experiments"), are unattainable (Kuhn, 1970a; Popper, 1970; Blaug, 1980; Ravetz, 1984).<sup>2</sup>

The empirical indeterminacy of theories [(*"factual underdetermination"* for Giddens (1979))] represents a vent through which values, beliefs and other social biases may intrude into scientific analysis. Here we have a contemporary version of what Voltaire might have said through Pangloss: that because theories are ultimately irrefutable and unprovable, bias and partisan values inevitably pre-structure research. Such biases, in the form of *"this-is-the-best-of-all-possible-worlds"* theorizing, renders *Candide* helpless in the face of each new disaster. In contemporary science, prevailing values, perceptions and other predispositions, inure scholars to certain kinds of discovery, and debar them from others.

<sup>2</sup> Readers might be puzzled about the apparently contradictory status of "facts" in this research. On one hand, the paper criticizes empiricism, and on the other hand, it uses empirical evidence to support its case. "Facts" are seen here as both socially and objectively (*sic.*) constituted. Facts are objective in the restricted sense that the object of theory (the reality that facts putatively represent) is superior to the subject in that it can surpass the subject's theoretical comprehension and can negate or disaffirm subjective cognition (for this reason, there can never be an absolute, complete, or sovereign theory). The theoretical consciousness of the subject is not derivative of reality however: facts are theoretically informed and socially attributed labels, and consciousness may transcend reality by negating contradictions between the concept and the object. This disruptive potential of theoretical consciousness, of unmasking fictions or "negating negations", creates a state of flux and makes it possible to reveal the nature of the particular, by observing the processes of mutual alteration between object and totality. An object's identity is never frozen into facts but is in a permanent state of becoming. In this sense, meaning and identity are dynamically (dialectically) related in that they are both permanent, yet changing. This epistemological position is elaborated in recent controversies over the links between Adorno with French "post-structuralist" thinking (Buck-Morse, 1977; Derrida, 1978; Ryan, 1982; Woods, 1979; Neimark and Tinker, 1985, 1987; Lehman & Tinker, 1987; Dews, 1983, 1986).

### INDIVIDUAL VALUES AND SOCIAL VALUES: THEIR RELATIVE IMPORTANCE

Modern research is conducted in a social and institutional context, and thus while an individual's values, assumptions, and perceptions may predicate research, these are preconditioned by social and institutional factors. Institutions train, hire, promote, pay, motivate and fire individual researchers, and help decide what research should be undertaken through the commodification of research activities (Baritz, 1960; Kidron, 1974; Rose & Rose, 1969; Shaw, 1975).

Barnes has underlined the importance of social and institutional influences using Kuhn's concept of a paradigm — a disciplinary matrix of beliefs, values, perceptions, attitudes etc. — shared by members of a discipline or academic community (Kuhn, 1970a; Allen, 1975; Barnes, 1982). A disciplinary matrix is a vehicle by which modern science institutionalizes paradigms and belief systems, such as Pangloss's "best of all possible worlds". Later in this paper, we will examine a disciplinary matrix for accounting theories, expressed in terms of a network of citational and theoretical linkages with other scientific disciplines.

The notion of a disciplinary matrix focusses attention on the social and institutional roots of science, and the kinds of value biases that may precondition theorizing and its policy implications. In social systems, characterized by competition and conflict, scientific disciplines may be captured by vested interests, with the result that theories become ideological instruments, used in social conflict, in a struggle for control.<sup>3</sup>

The remainder of the paper reviews this proposition in the light of two theories that have been widely appropriated in the accounting literature: Agency Theory and Transaction Cost Theory. While these theories originated outside

the accounting literature, they are significant in that they have been adopted and used by accounting researchers. The intentionality of theorists and accounting practitioners is not of primary concern here: the important issue is whether, intentionally or otherwise, these theories function to mask the appropriative role of accounting in distributional conflicts. This is the primary attribute of a "social ideology" in the sense of the term offered here (Ollman, 1975).

The appropriative and masking functions of ideology are concretized into three traits in this research; this definition is then used to investigate the ideological propensities of Agency and Transaction Cost theories.

The three traits of a theoretical ideology are as follows:

1. Public policy advocacy, based on a theoretical position, typically exceeds the authority warranted to it by empirical data.
2. Certain unarticulated assumptions permit a theory to advance some social interests at the expense of others. Pangloss's this-is-the-best-of-all-possible-worlds exemplifies, what are called, "naturalizing assumptions" that are of central concern to this paper;
3. The genesis of a theoretical ideology resides in its role in social conditioning in that, historically, theories are the product of antagonistic needs of various social constituencies.<sup>4</sup>

The paper examines two accounting theories to see if they exhibit the above hallmarks of an ideology. The next section describes Agency Theory and Transaction Cost Theory; two theories that have been used to advocate deregulation in accounting and other realms. Deregulation is given prominence here to highlight the distributional potential of accounting theorizing: its impact on the distribution of income and wealth between various social interests. The paper uses a definition of ideology based on the above three traits to assess the

<sup>3</sup> Burchell *et al.* (1980) provide an excellent review of the many ways in which accounting is becoming an institutional and political force in social conflict. They carefully avoid "vulgar" interpretations of dominance and exploitation and focus on the part played by regimes of truth in constituting accounting practices.

<sup>4</sup> These traits of theoretical ideology are not orthogonal; specifically, the last trait is a precondition for the other two (although it is not fully expressed by them).

ideological content of agency and transaction cost approaches. Finally, the interconnections between accounting theorizing and other social belief systems are summarized in terms of a Kuhnian disciplinary matrix. Thence we see how accounting opposes, interweaves, synchronizes, and harmonizes with other social beliefs to form cogent social ideologies (Burchell *et al.*, 1985; Lehman & Tinker, 1987).

## THEORIES AS REDISTRIBUTIVE FORCES

### *Theoretical challenges to Berle & Means*

Corporate regulation is used here to highlight the potential of accounting theorizing as a weapon in distributional conflicts. Parenthetically, it should be noted that this paper is not about regulation *per se*, nor is it "for" or "against" regulation; rather, it uses controversies over accounting regulation as a site for exploring the role of theorizing in social conflict.<sup>5</sup>

Proponents of deregulation invariably begin by attempting to rebut the work of Berle & Means (Berle & Means, 1932; Alchian & Demsetz, 1972; Benston, 1979–80, p. 4; Fama, 1980, p. 288; Jensen & Meckling, 1976, p. 305; Williamson, 1975, pp. 135–136, 238–263). Berle & Means noted that some corporations had become so large that their managers could no longer be assumed to be faithful and loyal ser-

vants of the owners. They concluded that a fundamental divergence of interests had emerged between the owners and managers of large corporations, and proposed that management be regulated to restore power to the owners (Berle & Means, 1932; Monsen & Downs, 1965; Williamson, 1975, pp. 238–263).

Challenges to Berle & Means gathered momentum in the mid-1960s (Coase, 1937, 1959; Alchian, 1965, 1968; Alchian & Demsetz, 1972; Williamson, 1964, 1970, 1975, 1981; Chandler, 1977; Jensen & Meckling, 1976).<sup>6</sup> These critiques culminated in a variety of new theoretical positions; the two examples that are considered here are Agency Theory and Transaction-Cost Theory.<sup>7</sup>

### *Agency theory*

An agency relationship involves a principal and the representative or steward of the principal. The steward (or agency) is employed to act on behalf of the principal. A major theoretical concern is whether it is valid to assume that managers (agents) are constrained to act in the interests of owners (principals) or whether they enjoy a discretion and autonomy to act as they please.

According to Jensen & Meckling, a firm's owners incur certain costs that are exclusively associated with the agency relationship itself (Jen-

<sup>5</sup> "Deregulation" is a misnomer in that many writers who use the term are really arguing that regulation by market forces is superior to government regulation.

<sup>6</sup> Coase (1937) is frequently credited with having originated the concepts underlying Agency Theory as well as Transaction Cost Theory. He characterized the firm as a set of internal production activities where managerial authority had replaced repeated contracting between market actors. Alchian & Demsetz developed Coase's work by rejecting the focus on authority and emphasizing instead the firm as a nexus of contracts. From this simple elaboration of the neoclassical theory of the firm, they explicated the role of one more factor — the monitoring services required to ensure that contracts were satisfactorily established and performed (Alchian & Demsetz, 1972). Alchian & Demsetz retained a focus on owner–employee and "internal" production relations; Jensen & Meckling (1976) expanded this conception to include all factor and product market participants who are related contractually (Jensen & Meckling, 1976, p. 310).

<sup>7</sup> While Agency Theory and Transaction Cost Theory are usually used to argue in favor of deregulation by the state, there is no logical reason why these theories could not be used to support the reverse case (i.e. in favor of state regulation). After all, if the Securities and Exchange Commission, Civil Aeronautics Board, Federal Trade Commission and other state agencies, are all regarded as responses to market demand, then they may be viewed as the result of "free market" equilibrating processes, and are efficient in this specific sense. If will be argued subsequently that the fact that these theories have been used against state regulation, shows how theories may be "captured" and used to "apologize" for vested interests in political processes (Watts & Zimmerman, 1978, 1979; Tinker *et al.*, 1982). There is no reason why this political use of theories need abide by academic rules of logic or codes of conduct.

sen & Meckling, 1976).<sup>8</sup> In total, these agency costs represent the losses that the owners could avoid if they undertook to manage the firm themselves. Agency costs include, therefore, losses (to the owners) due to "shirking", misappropriation of the firm's assets, and investments made to enhance the psychic income of managers rather than profits (company holidays, Persian rugs, art objects in executive suites, expensive lunches, etc).

Agency costs can be reduced in a number of ways. The owners may implement bonding agreements that restrict managements' discretion; they may motivate management with various incentive contracting schemes (e.g. stock option plans); and they may install monitoring systems (e.g. audits, budget restrictions, formal control systems) to verify that management have properly discharged their stewardship obligations. Thus, a wide range of methods serve to minimize agency costs (Jensen & Meckling, 1976, p. 323; Baiman, 1982; Demski & Feltham, 1978).

The essence of Jensen & Meckling's response to Berle & Means is that the owners are unlikely to absorb the full agency cost because, through

bonding, monitoring and incentive schemes, they are able to motivate managements' decisions to accord with their own interests. Advocates of Agency Theory offer evidence from various studies to show that this is what happens in reality.<sup>9</sup>

Managements' abuse of its fiduciary position is restricted by the competitive environment. Benston identifies three markets that constrain managerial discretion: the market for the firm's final goods and services; the market for financial resources and corporate control, and the market for managerial services.<sup>10</sup> These market forces augment the disciplining influence of internal and external monitoring systems (Benston, 1982a, b, pp. 89–90).<sup>11</sup>

### *Transaction cost theory*

Unlike Agency Theory, Transaction Cost Theory adopts a macroeconomic perspective: it takes the origins and evolution of large corporations as central to its analysis. What is distinctive about transaction cost analysis is its view that the corporate form and market system are alternative governance structures.

<sup>8</sup> As an opportunity cost concept, Jensen & Meckling's formulation may be criticized on two grounds: first, it fails to deal with the very real possibility that the special entrepreneurial skills of management may result in benefits to the owner that far outweigh the costs of shirking, prerequisites, etc. In such a case, there would be an opportunity gain (not loss) to the agency relationship. Second, the opportunity foregone (by pursuing the agency relationship) is more likely to be that which would include employing the next best (monitored) management team system rather than a "do-it-yourself" option.

<sup>9</sup> Benston claims that, prior to the 1933 and 1934 Securities Acts, investors and management entered into voluntary "tailor-made" monitoring and bonding contracts without any need for compulsory disclosure rules. Similarly, Watts & Zimmerman's studies of English auditing practices prior to the Companies Acts suggest that, in a "free market" (devoid of government interference), auditing and bonding served to align managements' behavior with the owners' interests (Benston, 1973; Watts & Zimmerman, 1978, 1979).

<sup>10</sup> Benston asserts that customers will not pay prices that are inflated by management appropriations when alternative products at lower prices are available. Additionally, managers who squander shareholder's funds (or are otherwise inept) will be penalized, either when they attempt to raise new investment funds, or by attracting takeover bidders who feel that they can make more efficient use of the firm's assets. The market for managerial services provides further restraint on misappropriations and ineptness because (it is argued) managers' long-run remuneration will depend on the adequacy of their "track records" (Ross, 1979).

<sup>11</sup> Internal and external information systems serve to monitor the behavior of management at all levels in the organization. Fama (1980) contends that the impact of such systems has been underestimated. He argues that: first, it is easy for shareholders whose management are acting dysfunctionally to dispose of their holdings, and invest elsewhere rather than try to change the management; second, that management have the greatest stake in effective monitoring systems because a manager's success and rewards depends on the performance of that person's peers, superiors and subordinates. Consequently, each manager's self-interest is best served if the performance of other managers is efficiently monitored.

A governance structure is a system for implementing and monitoring the array of economic transactions underlying the production of a particular commodity. In the transaction cost conception of the world, transactions are regulated by implicit and explicit agreements that define the conditions and terms of economic relationships. For transaction cost theorists, the aggregate of these agreements (contracts) define the firm as the sum of relations between the firm's factor and product market participants (customers, employees, federal authorities, suppliers, capital providers, state authorities, etc.).

A governance structure administers and monitors the firm's complex of contracts; it integrates and coordinates the myriad of transactions into a working entity. "Governance" is virtually synonymous with "management" in this view; the corporation is seen as a configuration of contractual relations and transactions.

For Williamson, a leading proponent of Transaction Cost Theory, corporate management structures are efficient governance structures because their (transaction) costs of operation are lower than the cost of alternative governance structures. Imagine a situation where the various employees, customers, suppliers, managers, etc. of the telephone company were not "collectivized" under one corporate form, but were independent operators who were continually contracting and recontracting in various factor and product markets. Such a market-based governance structure might eventually produce a telephone service, but its social cost would far exceed that of producing under the regime of a unified corporate governance structure.

For Williamson, the corporate governance structure achieves a level of efficiency, specialization and coordination that far exceeds anything attainable under a market regime of freely contracting independent producers. Advocates of this viewpoint claim that proof of the efficiency of corporate governance structures is to be found in its historical and economic survival: its very existence is taken to demonstrate its superiority over all alternatives. Williamson (1975, 1981) and Chandler (1962, 1977) give

numerous examples of corporate governance structures that have survived the market test and therefore (in their view) represent the best available governance forms (for instance, General Motors; A.T.&T.; Standard Oil; U.S. Steel).

Accounting and other monitoring systems (such as auditing) are integral parts of a corporate governance structure, and thus they too are seen to be efficient outcomes of a market process (Spicer & Ballew, 1983).

Transaction Cost Theory has been extended to provide an analytical framework for organizational design, including the design of budgeting and other accounting monitoring systems. (Ouchi & Johnson, 1978; Ouchi, 1979a, b; Williamson, 1976, 1980; Demski & Feltham, 1978; Baiman, 1982; Spicer & Ballew, 1983). These studies fulfil Williamson's vision for transaction-cost theory: a new, unifying, general framework for the business and social sciences, that provides an analytical perspective to organizational and policy studies where none existed previously and offers, to economics, a conceptualization of the internal decision system of the firm (i.e. the governance structure) in place of what previously was regarded as a black box (Williamson, 1976, 1980, 1981; Ouchi, 1979a, b; Bonini, Simon, 1957, 1959, 1969). Spicer & Ballew (1983) have argued strongly in favor of using the transaction cost rationale for the design of management accounting monitoring systems.

The policy implications of Transaction Cost Theory favor monitoring systems that have evolved "freely" through competitive market processes, but not those that emanate through a politico-regulatory mandate (Williamson, 1975, pp. 260–263, 1980). These implications accord with proposals made by some agency theorists (Jensen & Meckling, 1980; Fama, 1980; Benston, 1979–80, 1982a, b) however, transaction cost and agency work differs in one important respect: in the likelihood of monopoly. Transaction cost analysts accept the possibility that the most efficient governance structures may also be monopolies, while agency theorists, such as Benston, claim that market forces and the influence of monitoring systems minimize the



emergence of monopolies.<sup>12</sup> (Benston, 1982b, p. 90).

### REDISTRIBUTION THROUGH DEREGULATORY THEORIZING

Agency and transaction cost theorizing has been closely allied to the task of promoting corporate deregulation. Through deregulation controversies therefore, we can explore the potential distributional affects of accounting theorizing.

Jensen & Meckling hold that regulation and other interventions into the affairs of private enterprise were primarily responsible for the financial crisis of New York City, the collapse of Penn Central, the poor performance of the stock market over the last decade, and the mediocre economic growth of many Latin American countries (Jensen & Meckling, 1980).

These theorists fear that corporations will not survive governmental regulation because they see a basic antagonism between democracy and the market system: "... we see little reason to believe that the trend towards more and more government ... can be checked by electing the "right" people to office. Only radical change of some sort in the basic structure of our political institutions at this point could alter the course of events. . ." (Jensen & Meckling, 1980, pp. 4, 22). Present developments point towards a historical era that resembles the early Middle Ages in Jensen & Meckling's view; leading to "the ultimate destruction of Western civilization and its institutional heritage" (Jensen & Meckling, 1980, p. 22, quoting from Henry Simons, 1948).

Jensen & Meckling have harnessed agency research in controversies surrounding the high bonuses paid to corporate executives (\$7 million to the chairman of Ford, \$13 million to the chairman of NCR, 46 executives who earned in excess of \$5 million.) Agency research is cited to

support arguments that such payments may be fully justified in terms of shareholder interests (Seligman, 1984, pp. 57-62).

Benston advocates the removal of much of the regulatory burden from corporations. He rejects mandatory accounting standards as infeasible, whether they are promulgated by the profession or by the SEC. Accountants have no comparative advantage in measuring economic income and economic wealth (or social costs and benefits) in Benston's view, and subject to the regulatory discipline of the free market, Benston concludes that corporations alone are the best judges of what to disclose (Benston, 1970-80, 1982a, b).

Like agency theorists, transaction cost researchers argue that market processes provide better regulatory systems than those mandated by the state. Williamson uses Transaction Cost Theory to argue for a "more sympathetic posture by the antitrust enforcement agencies towards conglomerates" (Williamson, 1975, p. 260). In relation to the dominant firms in an industry, he concludes that, "many of the allegations of anticompetitive conduct are contrived. The broadside attack that some lawyers and economists have leveled against conglomerates appears to be overdrawn" (pp. 260-262).

The debates over regulation highlight the potential impact of theorizing in distributional conflicts (i.e. conflicts ultimately over peoples mode of social existence). It is in this regard that we refer to the social (material) origins of theories; the values, perceptions, attitudes, and other predispositions that, for Voltaire and many contemporary scholars, prestructure scientific theorizing.

How are we to assess the validity of policy proposals based on such scientific theorizing? How can we cull those ideological misconceptions that aid in the expropriation of income of various social constituencies? Specifically, how are we to regard Agency and Transaction Cost theories: as accurate and useful construals of re-

<sup>12</sup> In one passage, Williamson goes so far as to suggest that he agrees with those Chicago economists who see many social benefits to the monopolistic form (Williamson, 1980, pp. 1542-1543). Williamson has little difficulty in accepting that corporations possessing efficient (yet monopolistic) governance structures have managers who enjoy a certain discretion in how they behave. It is the "rent" corresponding to this discretion that entices the owners and others to create monitoring systems for curtailing the discretion of management.

ality, or as ideological misrepresentations? Answers to these questions hinge on devising a definition of ideology that is sufficiently discriminating to reveal if and how a particular theory is compromised.

#### THEORY AS IDEOLOGY: THREE DEFINING PROPERTIES

The concept of ideology is one of the most controversial and widely debated in social science (see for instance Blackburn, 1972; Plamenatz, 1970; Dobb, 1973; Lukacs, 1971; Marcuse, 1964; Habermas, 1971a, b, 1976; Katouzian, 1980; Lecourt, 1981; Manneheim, 1963; Althusser, 1969). The following passages sketch the perspective on ideology that is employed here.

The three traits of ideology outlined previously may be summarized as follows: first, an overreliance on empirical philosophy and underestimation of the consequences of factual indeterminacy (which gives theorists virtually a "free-hand" in interpreting results); second, an inherently conservative bias that, by naturalizing social phenomena, favors the status quo; and third, a failure to deal, in a systematic way, with the beneficial interests that promote theorizing.

These three traits are used in the following discussion to evaluate Agency and Transaction Cost Theories.

#### *Overreliance on empirical philosophy*

The validity or truth-content of a theory cannot be resolved unequivocally on empirical grounds alone and, in this sense, all theories are empirically indeterminate or "factually underdetermined" (Quine, 1980; Chisholm, 1965; Hunt & Schwartz, 1972; Steedman-Jones, 1972; Giddens, 1979). Despite this limitation, empiricist philosophy dominates accounting research relative to other philosophical positions (Tinker *et al.*, 1982; Chua, 1986). Below, we examine three specific reasons for the limitations of empiricism:

1. The lack of prior independence between observational variables and theoretical variables;
2. The absence of satisfactory rules of correspondence for linking observational variables and theoretical variables;
3. The conservative value biases inherent in empirical approaches that impede theoretical creativity and innovation.

These three criticisms are discussed in relation to Fig. 1.

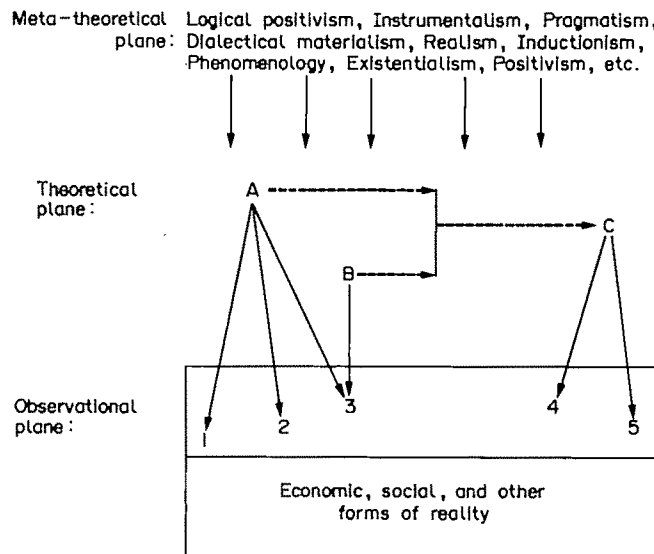


Fig. 1. The factual underdetermination of theories.

Figure 1 shows a theory that posits a causal relationship between three conceptual variables ( $A$ ,  $B$  and  $C$ ). For instance, the theory might assert that intelligence ( $C$ ) is governed by education ( $A$ ) and cerebral activity ( $B$ ); or that economic income ( $C$ ) is determined by the munificence of the firm's environment ( $A$ ) and the quality of its management ( $B$ ). The conceptual variables ( $A$ ,  $B$ , and  $C$ ) cannot be observed directly; they can only be discerned through what are variously called, surrogate variables, observation variables or data variables (1, 2, 3, 4 and 5). Thus, the dependent variable ( $C$ ) might be measured in terms of various IQ tests (4 and 5), or a combination of dividends (4) and the changes in stock price (5). The important issue to note is that the data variables are mere proxies for conceptual variables.

Conceptual variables and observational variables are shown on the two lower planes in Fig. 1. A third (upper) plane is also presented: a "meta-theoretical plane" that encompasses alternative epistemological perspectives or rationalities for conducting the scientific activities exhibited on the other two planes. Thus, for instance, pragmatic, empiricist, instrumentalist, and falsificationist epistemologies, each possess a different concept of "truth" and "validity", and thus each legitimizes different theoretical and policy positions at the scientific level. The importance of this meta-theoretical (epistemological) plane is illustrated by disputes in the literature over Friedman's instrumentalist philosophy and the epistemological precepts of Watts & Zimmerman's work (Burrell & Morgan, 1979; Blaug, 1980; Caldwell, 1982, 1984; Christenson, 1983).

Using Fig. 1, we explore below the problems associated with empiricist philosophy in greater detail.

*Dependencies between observational and theoretical variables.* Empiricism requires that an independence exist between the observational variables ("facts") and theoretical variables (alphabetical and numerical variables respectively in Fig. 1). "Facts" are supposed to draw on an independent reality for checking the

validity of theories. But several philosophers have argued that this independence is lacking: facts may take on different meanings, depending on the theoretical framework that conceives of the fact (Wittgenstein, 1953; Kuhn, 1970b; Feyerabend, 1973, 1975) and depending on the language in which the "fact" is expressed (Chomsky, 1967, 1969; Wittgenstein, 1953).

Wittgenstein provides two much quoted examples from gestalt psychology: a drawing that may be interpreted as either a duck or a rabbit, and a drawing that can be seen either as a black cross on a white background or as a white cross on a black background (Wittgenstein, 1953). Similar examples exist in other areas: an IQ rating may designate social and economic superiority or racial and income class membership; accounting profit may reflect economic viability or measure the rate of social exploitation. In each case, "facts" have a meaning, credibility and significance that depends on their linguistic and theoretical context. If facts are "theory relative" in the sense that the same fact takes on different meanings within different theoretical frames, then "facts" cannot be an independent source for adjudicating the validity of theories (Kuhn, 1970a; Feyerabend, 1969, 1970; Popper, 1970; Lakatos, 1970).

*Absence of rules of correspondence.* Many difficulties in doing empirical work arise from ambiguities concerning rules of correspondence or semantic rules. These rules are meant to ensure that observations or measures (1, 2, 3, 4 and 5) accurately depict theoretical variables ( $A$ ,  $B$ , and  $C$ ) (Firestone, 1971). Rules of correspondence are abstract statements about how, and under what conditions, a given set of observable stimuli are to be encoded as signs of theoretical concepts or variables (Firestone & Chadwick, 1975, p. 35).

Chisholm, in a classic paper on "The Problem of Empiricism", highlights serious flaws in the conventional philosophical approach to appraising the correspondence between theoretical variables, and their data variable counterparts. Conventionally, an adequate correspondence is said to exist if a "normal" observer (a "typical"

scientist) would consider the data variables to correlate with, and thereby exhaust the variance in, theoretical or conceptual variables. Unfortunately, this approach first requires that we find a representative or "normal" observer who would perceive these relations. This definition requires, in turn, a definition of a second "normal" observer who would recognize the first normal observer, which in turn, necessitates a third definition, and so on, *ad infinitum* (Chisholm, 1965; Quine, 1980; Morick, 1980, p. 10). Rules of correspondence are not capable of precise definition because the definition degenerates into an infinite regress.

To the above difficulties, we may add others: in circumstances of scientific development, the perceptions of a "normal" observer may be irrelevant for future work; today's maverick or iconoclast may have perceptions that are much more relevant for the future.

*Conservative biases in empirical philosophy.* Several philosophers contend that Empiricism impedes innovation, creativity and positive social change. This criticism can be seen (in terms of Fig. 1) as insufficient innovation and speculation on the "Theoretical Level Plane" as it tries to make sense of observations on the plane below. Feyerabend refers to Empiricism's "traditional attempts to rid science and philosophy of metaphysics, thus ignoring the valuable ways in which scientists carry out their enterprise in real life." He claims that, "The elimination of metaphysics, far from increasing the empirical content of remaining theories, is liable to turn those theories into dogmas. . . A one-theory system in science would be as unproductive as a one-party system in the state" (Feyerabend,

1963).

Novack expresses similar concerns when he argues that Empiricism proceeds from the premise that "all knowledge is based on experience" but (he adds) the empiricist ". . . is not clear on two further questions: (a) what generates this experience? and (b) what are the things which experience informs us about?" (Novack, 1971, p. 21).

Because a variety of conflicting epistemological criteria might be appealed to, and because of the factual indeterminacy of theories, assessing the validity of theories is a most ambiguous exercise.<sup>13</sup> Consider Benston's critique of Simon's concept of satisficing: that "satisficing" is really constrained profit maximizing and thus, ergo: monopolies are profit maximizers and, in this sense, are socially efficient (Benston, 1982b, p. 90).<sup>14</sup> The point is that the "satisficing vs maximizing" debate cannot be resolved empirically because the propositions involved are, in a Popperian sense, "unscientific and untestable".

For the proposition: "Firms maximize profits", to be scientifically testable, Popper requires that it be possible to define observable circumstances which, if they occurred, would invalidate the theory (Popper, 1968, pp. 40-43). In this sense, a theory must be capable of falsification. Of the many epistemological difficulties associated with theorizing in accounting and neoclassical economics, two are especially problematic in attempting to meet Popper's terms: first, no time specification is usually associated with predictions emanating from these theories; thus it is always possible to "rationalize" a negative result by asserting that it will be corrected in an (undefined) long run. Second, while neoclas-

<sup>13</sup> Kuhn, Popper, Lakatos and Feyerabend discuss some of these difficulties in Lakatos & Musgrave (1970) and Feyerabend, (1975). We note briefly here just a few of the difficulties: the absence of any measure of degrees of belief or degrees of corroboration for comparing the relative merits of competing theories; the incommensurability of the language systems in which competing paradigms are situated and the difficulty and sometimes impossibility of translating between them; problems of attributing results to either the scientific theory or the observation theory (Nidditch, 1968, pp. 1-12; Mackie, 1963, pp. 265-277) and difficulties due to poor rules of correspondence linking observations to concepts (Caws, 1965, pp. 43-90; Schlesinger, 1964, pp. 394-405).

<sup>14</sup> Satisficing behavior (the discretionary behavior of top management) translates into constrained profit maximizing in Benston's view, where under the watchful eye of efficient monitoring systems, managers are "directed" to behave in the owners' interest (Benston, 1982b).

sicists supposedly attribute a "hyperrationality" to economic actors, the empirical mechanisms by which this operates, especially the processes by which expectations are formed, are theoretically unspecified. (Clarkson, 1962; Simon, 1957, 1969). Consequently, adverse empirical results can be attributed to variations in the subjectivity (rationality) of economic agents.

The factual indeterminacy of theories opens a vent through which individual scientists inevitably interject their social values. In this context, it becomes important to analyze how scientific discretion is deployed and exercised. We find this exemplified by Benston in his opposition to mandatory financial and social responsibility reporting. In arguing his case, Benston places the "burden of proof" on those seeking the change. Because his opponents have failed to measure "real" economic income, and because they are unable to make interpersonal utility comparisons, he rejects mandated systems in favor of monitoring systems created by free market processes (Benston, 1982a). Market regulation was not asked to prove itself by Benston, the burden of proof was placed on those seeking to replace market mechanisms with bureaucratic ones.<sup>15</sup> In relation to other accounting research, Christenson (1983) provides an excellent critique of the expedient uses of empirical data by members of the Rochester School.

#### *Mystifying reality by naturalizing social phenomena*

A theory may convey ideological biases in its immanent structure; particularly through its initial assumptions about what it takes as variable and susceptible to manipulation, and what it treats as fixed, and thus not open to question. These agenda-setting and framing biases reflect priorities about what is considered important, what can be changed, and what must be left alone (Barnes, 1982; Giddens, 1979).

The axioms of theories frequently serve as conduits for bias. Assumptions that predicate theories may change from one social era to the next (Hirschman, 1977). For instance, contem-

porary economic theory stresses the "naturalness" and immutability of traits like "acquisitiveness", "competitiveness", and "greed". These attributes are held to be "natural" because of their ubiquity in Nature, human nature, and the business environment. They frequently resonate with other themes by suggesting that — as in nature — only the fit, strong and efficient should survive, and the unproductive and disabled should be eradicated (Spencer, 1862, 1916; Rose, 1979; Karier, 1972; Henderson, 1976; Ingleby, 1976).

Alternative assumptions, while they are available, are frequently overlooked in the policy considerations of neoclassical economics, including those of Agency and Transaction Cost Theorizing. For instance, in countering arguments favoring a cutback in state regulation, Polanyi reviews the rise of English capitalism, and describes a complex interplay between market and state processes. He rejects the suggestion that the genesis of capitalism lay in unbridled market forces, and shows that the state provided necessary groundwork and subsequently sought to protect the social and cultural sphere from the stringencies of unregulated markets (Polanyi, 1957, pp. 53–67, 135–192; Block & Somers, 1984).

Theories that equate social institutions with natural phenomena exemplify the kinds of biases referred to above. For Aristotle, the institution of slavery was as natural as the movement of planets, thus he accepted slavery as immutable, universal and eternal (McBride, 1977, p. 23). Similarly, modern theories naturalize phenomena such as competition, acquisitiveness, intelligence, markets, by suggesting that they are regulated by impartial forces (like the laws of evolution or the laws of nature), making them appear as inevitable and universal (Giddens, 1979). In such ways, certain kinds of social change are excluded from the theoretical discussion agenda.

Naturalistic theorizing mystifies social reality in that it deprives some social members of a way

<sup>15</sup> Jensen (1982) criticizes Dopuch & Simunic (1982) for "stacking the deck" in a similar way.

of seeing their political situation, opportunities and possibilities. As a result, theories that naturalize the status quo participate in social conflict. Barthes (1973) describes this role of theory as, "naturalizing the present".

Giddens (1979, pp. 230–238) traces the origins of naturalistic thinking in the social sciences to the work of Auguste Comte (1798–1857). Comte's "hierarchy of sciences" was intended as a masterplan for developing all of Science, beginning with areas most abstract and distant from human experience (mathematics and physics) and, once a firm foundation was established, advancing to refractory subjects, like economics, psychology and sociology.

In the Comtean vision, not only is maturity of natural science a prerequisite for developments in the social science, but the former is something of an apotheosis for the latter.<sup>16</sup> In this sense, the social sciences may be said to be "naturalized" ("the social" has derivative status relative to "the natural") (Giddens, 1979, pp. 237–238).

We see early expressions of Comte's views in business and social literature in the works of nineteenth century social Darwinists such as Spencer, Fiske and Sumner. Social Darwinism was particularly popular in the U.S.A.: Darwin was made an honorary member of the American Philosophical Society in 1869, ten years before his own university, Cambridge, awarded him an honorary degree. For Spencer, who was even more popular than Darwin in America, social evolution was only a transitional phase to a new social order; thus all impediments to change tended to be heavily criticized by Spencer and his followers (Spencer, 1864, pp. 79–80).<sup>17</sup> For instance, Spencer attacked state aid to the poor. They were unfit, he said, and should be eliminated. "The whole effort of nature is to get rid of such, to clear the world of them, and make room for the better" (Hofstad-

ter, 1955, p. 41).

Public policy towards business was a primary target of Spencer's teachings: James Hill, a railroad magnate, in an essay defending business consolidation, argued that "the fortunes of the railroad companies are determined by the law of the survival of the fittest" (a phrase originally coined by Spencer) and implied that the absorption of smaller by larger railroads represents the industrial analogy to the victory of the strong (Spencer, 1910, p. 126). John D. Rockefeller announced in a Sunday school address that the "growth of large business is merely the survival of the fittest" and, as in the growth of the American Beauty Rose, its splendor and fragrance can only be attained by sacrificing the early buds (competitors) that grow around it. Andrew Carnegie, a close friend of Spencer, wrote that he was troubled about the collapse of Christian theology, until he read Spencer and Darwin (Carnegie, 1920, p. 327).

These examples show how scientific theory may be used to naturalize (and thus authenticate) the prevailing social order: poverty is not socially created but is inevitable and ineluctable; corporations thrive in their natural habitat of free markets, without the hindrances of "unnatural" state intervention. As Polanyi has observed concerning the English context, "The laws of commerce were the laws of nature and consequently the laws of God. . . [Bentham held the view that] Let the market be given charge of the poor, and things would look after themselves . . . Poverty was Nature surviving in Society, its physical sanction was hunger" (Polanyi, 1957, pp. 117–123).

The above highlight the way theorizing may be used, perhaps inadvertently, to support eristic social policies, in a manner that is putatively apolitical and asocial (i.e. "natural"). Analogously, below, we consider three examples

<sup>16</sup> Giddens shows how widespread the misconception was as to the derivative status of the social sciences by quoting from Montesquieu, Condorcet, Comte, Marx, Durkheim, Parsons and others (Giddens, 1979, p. 241). He demonstrates that the intellectual lineage of the social sciences is quite independent of that of the natural sciences and certainly cannot be used to propagate the notion of a youthful status of the former relative to that of the latter (Giddens, 1979, pp. 241–242).

<sup>17</sup> For some of Spencer's critics, the connection to Comte was too direct; and they accused Spencer of plagiarizing Comte's work (Hofstadter, 1955, p. 20).

where naturalistic thinking appears to intrude in Agency and Transaction Cost Theorizing: first, in the conception of human nature; second, in assumptions about social institutions (e.g. corporations, markets and competition); and third, in the notion of property rights. While, in each case, the phenomena might have been naturalized "innocently" and with no deceit or dysfunctionalities intended, this, in-and-of-itself, does not diminish the consequences, and thus the importance of reviewing and reconsidering such matters here. The purpose of this paper is not inquisitorial, but to encourage a reevaluation of the direction of current theorizing.

*Naturalizing human nature.* Neoclassical economic theory provides an archetype of naturalistic thinking in its reified conception of the firm. It portrays the process of social production, and the class affiliations defining the relations between people joined in social production, as relations between "things" (resources from Nature). Consequently, social categories such as class, labor and capital are excluded from scrutiny, together with the social conflicts that they entail.<sup>18</sup> For instance, Fama unequivocally declares his aim to expunge social and personal content from agency analysis: he insists that the owners, managers and labor be conceived as "resources" interrelated by a set of contracts (Fama, 1980, pp. 288–290).

This depersonalization (or more accurately, desocialization) of the firm disguises the different terms under which people participate in social production, and the forms of conflict that such differences are likely to engender. Both labor and capital "earn" income from social pro-

duction in this view, thereby glossing over substantive differences in the terms of their participation. The survival of labor depends on securing employment in the economic realm, or social welfare provision in the political realm — labor invests its very life experience in production. In contrast, capitalists, qua capitalists, have no comparable personal dependence or investment in production. Yet the neoclassical view places capitalists on the same footing as labor (Tinker, 1987).

*Naturalizing socio-economic institutions.* Agency Theory and Transaction-Cost literature is replete with naturalistic assumptions about markets, competitive processes and the "survivors" of these processes (i.e. corporations).<sup>19</sup> It is taken for granted that competitive markets exist, that they are self regulating, and that they are directly analogous to evolutionary processes in that only the fittest are permitted to survive (Polanyi, 1957; Tinker, 1984; Block & Somers, 1984).

Hirshleifer (1977, p. 10–12; 1978; p. 322) describes competition as a biological universal; Benston (1982a) posits that monitoring systems evolve naturally and freely in market systems, and that these are far preferable to and mandatory arrangement. Jensen & Meckling (1980, pp. 4–6, 22) support the analysis of their Rochester colleagues with a gloomy prophecy that government encroachment on corporate rights and freedoms portends a return to the repression of the Middle Ages. Williamson and Chandler view the modern corporate form as the champion of a historic competitive struggle; for Williamson, this means the most transaction-cost efficient

<sup>18</sup> Redefining what are, in essence, relations between people as relations between things (resources, factors of productions, etc.) was called "reification" by Marx and was an important analytical concept in his critique of (what he termed) Ricardo's "eternal" concepts of "profit", "wages" and "rent" (Meek, 1975; Shaikh, 1981).

<sup>19</sup> Naturalistic theorizing is also prevalent in the organizational control and management control areas. Researchers in these areas relate their models to natural processes in order to authenticate their proposals (Tinker, 1986). Simon, for example, refers extensively to examples from Nature in exploring the "Architecture of Complexity" and in developing his rational design for organizational and individual problem solving (Simon, 1959, 1969). Both Williamson and Ouchi have attempted to extend Simon's work by designing hierarchical forms of control systems within the firm (Williamson, 1975, Ouchi and Johnson, 1977; Ouchi, 1979a, b). In this research, Simon's naturalistic arguments are supplemented with references to the natural selection of hierarchical monitoring systems.

governance structure (Williamson, 1975, 1981; Chandler, 1977).<sup>20</sup>

Despite pretensions to description, empiricism and showing how things are "naturally", naturalistic arguments carry a heavy prescriptive portmanteau (Tinker *et al.*, 1982). This normative view akin to Pangloss's "best of all possible worlds" insofar as it depends on an evolutionary assertion that the present social order is the fittest because it has withstood the test of time.

Two objections may be raised against this kind of reasoning: First, "what exists" does not necessarily correspond to "what should be". The corporate governance structures that exist today include the successful structures of tomorrow, and those destined for extinction; we have no way of distinguishing between the two.<sup>21</sup> More importantly, there is no reason why the social environment should be treated as inevitable and immutable; it has to be created, together with the institutions that populate it.

Second, a more telling objection to social Darwinism centers on the slanted way economists have actually employed these ideas. In the transaction cost research, for instance, naturalistic biases influence both the selection of the variables and the hypothesis as to direction of causality. Chandler's studies of the evolution of large corporations for example, uses a "Strategy-Structure" formulation that asserts that the profit maximizing strategy of the firm leads to an appropriate governance structure (one that, in Chandler's terms, minimizes administrative costs, and in Williamson's terms, minimizes

transaction-costs). These cost-economizing consequences follow directly from the motivations and competitive conditions assumed at the outset. Given these prior assumptions, Chandler (1962, 1977) and Williamson (1980), are able to assert that the governance structures of General Motors, J.P. Morgan's U.S. Steel, and Rockefeller's Standard Oil were all socially efficient administrative cost or transaction cost minimizers.

Beginning with different assumptions, others who have examined these case histories come to different conclusions. Consonant with Polanyi's early stress on monopolistic tendencies and bureaucratic processes, Du Boff and Herman (1980) challenge the "Strategy-Structure" formulation: they argue that competitive conditions were so weak and ineffective that market domination and control (rather than administrative efficiency) more accurately depicts the "strategy" of management. They cite the discriminatory pricing practices for transport that Rockefeller used in eliminating competition and building up Standard Oil; J. P. Morgan's consolidation (and curtailment of competition) in the steel industry by issuing watered stock; and attempts by the oil and automobile industries to dominate the US urban transit system.<sup>22</sup>

These examples challenge the causal ordering implicit in Chandler's naturalistic explanations: from environment, to strategy, to structure. Instead, Du Boff and Herman offer an alternative causal ordering: from a strategy of market domination, to a state of monopoly, to bureaucratic

<sup>20</sup> On an earlier occasion (in his doctoral thesis) Williamson was more skeptical about the "economics of natural selection" than in his most recent works on Transaction Cost Theory (Williamson, 1964, pp. 19-21). The "young" Williamson acknowledged that, "where conditions of competition are weak", many forms of business behavior (apart from profit maximization) will be consonant with economic natural selection (Williamson, 1982, p. 21). Unfortunately, the "mature" Williamson never explains how he reconciles his enthusiasm for the modern corporate governance structure as a socially efficient, transaction cost minimizing form, with the prevalence of the imperfectly competitive conditions identified by the young Williamson.

<sup>21</sup> It is the *misuse* of Darwinian theorizing that is at issue here. Darwin himself was quite cautious about the social policy implications of his work, compared with his nephew Galton and some of his more ardent disciples (Hofstadter, 1955). What is at stake are not the "intentions" of Darwin but the material effects of Darwinism as a system of social thought.

<sup>22</sup> Sloan of General Motors established the National Highway Users Federation in 1932 and this lobby then proceeded to capture highway trust funds. Subsequently, General Motors and other firms sponsored National City Lines that, between 1936 and 1950, acquired over 100 electric surface transit lines in over 45 cities, and ripped-out the lines, and put in buses (Du Boff & Herman, 1980, pp. 102-10). In 1980, in the face of escalating oil costs, Los Angeles considered a referendum to establish a surface transit system. Los Angeles was reputed to have one of the most efficient surface transit systems before it was removed earlier in this century. The cost of the scaled down replacement is estimated to exceed \$10 billion.



and wasteful corporate management structures.

*Naturalizing property rights as human rights.* For many theorists, property rights refer to the unabridged right to buy, sell and otherwise utilize assets; they are, "actions which the laws allows specific individual (owners) to take, including writing contracts with others" (Jensen & Meckling, 1980; Alchian, 1968; Alchian & Demsetz, 1972, pp. 16–27).

In the accounting literature, including agency and transaction cost work, the social constitution of "property rights" are rarely taken as problematic; frequently, their status is reified by appealing to naturalistic metonyms. Jensen & Meckling (1980) refer to the "brilliant fallacy" of perpetuating "the false distinction between so-called human rights and property rights: All rights are human rights, those who use the distinction are resorting to a clever semantic ploy." Since all rights are human rights in Jensen & Meckling's view, all conflicts resolves into interpersonal conflicts i.e. "[C]onflict over which individual will have what rights" (Jensen & Meckling, 1980, p. 80). *A fortiori*, conflict between groups consolidated into classes by their objective (sic.) interest is deemed not to exist.

Jensen & Meckling are thus able to equate property rights with the right to freedom of political expression, and freedom from terror, torture and intimidation. Property rights are thereby held to be universal, eternal and (in the words of the U.S. Declaration of Independence) "inalienable".

This conventional view fails to take account of important aspects that distinguish property rights. Unlike the laws of nature, property rights and human rights are not immutable or eternal; both are socially constituted. The concept of property only existed in the legal frameworks of certain societies, and the socially given right over the use of property developed relatively recently with the rise of capitalism. Paterson (1980) shows that the concepts of "owner", "ownership", and "property" were invented by the Romans in their laws of slavery. Because of the overwhelming presence of slaves in their society, and because slaves were a chattel and

the most common source of wealth, the Romans made a distinctive category for the relationship between master and slave. They invented the fictive legal paradigm of owners, ownership (dominium) and property. There was no preexisting notion of ownership of a thing called property; the Greeks, for example, had no such concept (Paterson, 1979, p. 38).

The concept of property rights has changed dramatically over the centuries. Tawney shows us that the concept of property and property rights are not universals, but are mutable forms, constituted and refined under capitalism. Tawney contrasts capitalist and feudal concepts of property; the latter stresses the social relations of obligation, duty and responsibility rather than economic possessions and entitlements:

[Feudal] Property is more than a mere aggregate of economic privileges, but a responsible office. Its *raison d'être* is not only income, but service. It is to secure its owner such means, and then no more than such means, as may enable him to perform those duties. . . which are involved in the particular status which he holds in the system. He who seeks more robs his superiors, or his dependents, or both. He who exploits his property with a single eye to its economic possibilities at once perverts its very essence and destroys his own moral title, for he has "every man's living and does no man's duty" (Tawney, 1926).

The feudal notion of property stresses the personal duties and responsibilities of the parties bound together by virtue of the property. Feudal property constitutes a set of personal relationships. In contrast, the modern bourgeoisie conception of property stresses the impersonal market relations between the buyer, seller and the commodity. The relation defines the various uses that property rights confer on the owner, including the right to limit the access and use of non-owners. This view of property carries with it a view of social community that is radically different from that found under feudalism: it privileges acquisition and ownership instead of duty and responsibility.

### *The social motivations of theorizing*

The third trait of a theoretical ideology lies in its lack of self-reflection; specifically, its inability to explain its own origins. A materialist view of

the origins of ideas posits that many beliefs arise from social conflict. Agency and transaction cost literature admits to conflict, but in asocial terms, either individualistically, or involving reified things (factors, resources, etc.) (Hunt, 1981).<sup>23</sup> Such views omit from consideration the agonistic relations immanent in our present social order (capitalism) and the ideological and other terrains of (class) conflict that this entails.<sup>24</sup>

Class inequalities may be a more fundamental source of conflict than the pluralistic clash of self-serving individuals. The existence of classes depends on the extent to which individuals have been socialized and thus individual self interest has been unified into opposing forces (Hunt, 1977). Insofar as orthodox analysis ignores class, it runs the risk of overlooking these trans-individual (structural) forces. For these reasons, the view of social conflict advanced here deviates from neoclassical reifications (the individual consumer, entrepreneur, laborer, etc.) and emphasizes social group and class forces (Allen, 1975; Miliband, 1970; Hunt, 1977; Poulantzas, 1975; Westergaard & Resler, 1975; Tinker & Lowe, 1984).

Social ideology originates in struggles between different social factions. It usually assumes a form that is consonant with reproducing the extant social order and does so by performing an apologizing role that legitimizes the status quo and mystifies the agonistic social relations of production.

The main proposition of this section refers to the partisan origins of scientific theorizing. If this proposition is correct, then the kinds of biases imputed to agency and transaction cost research are likely to be prevalent in other scientific belief systems. If class and group interests do indeed motivate and prestructure scientific ideas,

then we would expect to find a certain consistency and harmony between accounting and other belief systems.

Literature citations and references indicate linkages between different belief systems; they signify intellectual influences and relationships between beliefs. A network of schools of thought, linked by citations, would reflect the commonalities and reinforcements binding different disciplines.

Figure 2 is an attempt to provide such a network. (The hypothetical nature of the figure should not be underestimated.) It displays Agency Theory and Transaction Cost Theory (two prime rationales for deregulation) in their scientific-ideological context. Exponents of these two theories are widely cited in a range of applied and policy-oriented disciplines (e.g. management accounting, financial accounting, auditing, organization theory). These applied disciplines are shown at the bottom of the figure. Sociobiology has appeared in some economics and finance literature, but has had little direct impact on policy fields. Thus its influence, as a "meta-theory", is shown to be mediated by Agency Theory and economics (e.g. Becker's work on altruism) (Becker, 1976). Hirshleifer's work is shown as an important link between Agency Theory, sociobiology and biology; having published in all three fields. As Fig. 2 shows, Wilson (1976) has been a major contributor to genetics, biology, sociobiology and psychological anthropology. Wilson and Hirshleifer draw on the Nobel prizewinning work of Frisch, Lorenz and Tinbergen (in Ethology) as the main inspiration for their ideas.

Figure 2 posits a mutually reinforcing network of ideas; it is an attempt to concretize Kuhn's notion of a disciplinary matrix.<sup>25</sup> The figure hypo-

<sup>23</sup> "Reification" is not defined as "any" theoretical imposition on reality, but is limited to a re-presentation of social relations as relations between non-social, physical, concrete things (e.g. between commodities, money, objects, etc.) To define reification more broadly (as any intellectual imposition for instance) would render it analytically jejune because it would lose any discriminatory power (Dobb, 1973).

<sup>24</sup> This does not mean that "class" be taken, *a priori*, as an obligatory category for all social analysis. Rather, it suggests that such structural characteristics of society should not be automatically excluded from critical reflection (Mandel, 1962).

<sup>25</sup> Kuhn's notion of a paradigm change (scientific revolution) has been criticized for failing to fully appreciate the social underpinnings of scientific change (Feyerabend, 1970; Masterson, 1970; Allen, 1975). Kuhn sees the buildup of unsolved "puzzles" as providing the momentum for scientific change in a discipline. Other theorists have suggested that Kuhn mistakenly

thesizes affiliations between agency and transaction cost theorizing, and other systems of social beliefs. It posits that auditors, management accountants and other "practical persons" (represented in the categories at the bottom of the figure) are implicated in social conflicts, and are guided by naturalistic imperatives originating from Ethology, Biology and Genetics, Sociobiology, Agency Theory and Transaction-Cost Theory.

Figure 2 traces linkages in belief systems (though citations) to a range of applied domains. For instance, in the management accounting literature, Spicer & Van Ballew's paper (1983) figures prominently in recent working papers and draws extensively on Williamson's transaction

cost ideas and social Darwinian precepts of earlier periods. In the financial accounting realm, an overlap exists between economics, finance, and accounting, involving research that stresses the self-regulatory character of markets. Bridges between this work and natural self-regulatory processes exist in the writings of Hirshleifer and Becker. This conduit extends into the management accounting realm.

Figure 2 is not meant to imply the existence of a great "conspiracy of theorizing", originating from a single ideological source. Rather, the figure permits us to speculate about differences and similarities in the profusion of discourses occurring in a range of sciences in recent years (Foucault, 1973, 1980; Hopwood, 1987). In this

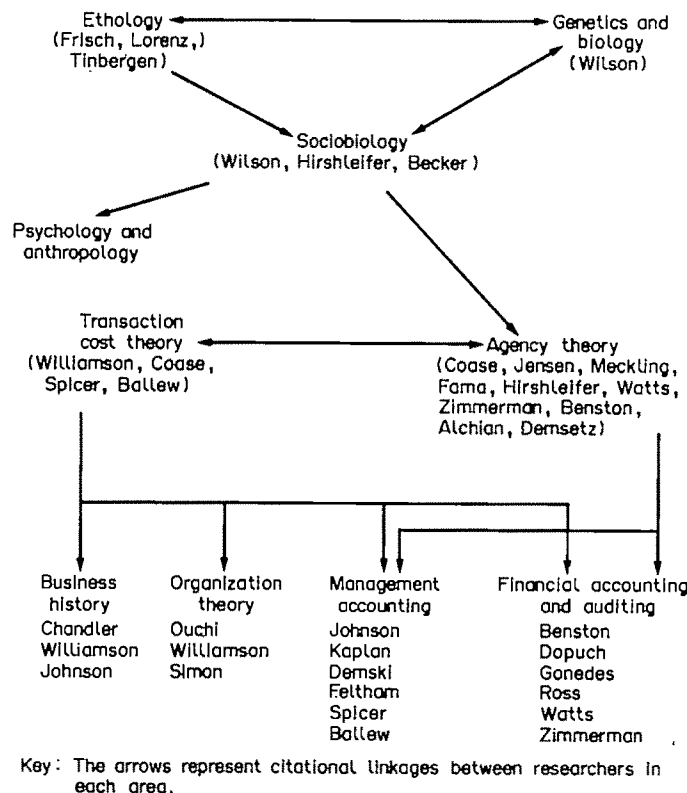


Fig. 2. The paradigmatic context of agency and transaction cost research.

attributes change to endogenous pressures; they argue that change is frequently due to sources that are exogenous to the paradigm in the form of crises within the social system of which the scientific community is part (Allen, 1975). The origins of Marginalism (as a counter to Marxism); the emergence of Taylorism and Fordism in management, the rise of Keynesianism and (currently) Monetarism, have all been examined in this way (Allen, 1975; Habermas, 1976; Braverman, 1974; Pollard, 1965; Edwards, 1979; Poulantzas, 1973).

manner, we may problematize the origins of accounting ideas, and thereby predicate our own practices with a greater self-reflectivity as to their (and our) partiality. This is the primary function of the figure: as an exploratory and speculative tool that aids investigation of the economic and discursive forces underlying accounting practices.

While the analysis points to a widespread use of naturalistic thinking across various disciplines, the causal connections remain largely unspecified. No single "root cause" of naturalistic theorizing is indicated, rather, its origins are shown in Fig. 2 to be systemic — residing in economic, political, social, scientific and cultural spheres.

### SUMMARY AND IMPLICATIONS

Joseph Schumpeter singles out what he calls "vision" as the leading component in ideology (Schumpeter, 1954). Vision mediates the complex shape of reality and the nature of the problems confronting mankind in any given historical situation and, in the form of ideology, it "enters on the very ground floor into the pre-analytical cognitive act . . . with material provided by our vision of things" (Schumpeter, 1954, pp. 41–42).

If ideology and values play the pre-analytic role that Schumpeter claims, then this underscores the importance of scrutinizing, in a systematic way, the values and ideology behind our theorizing. Such self-scrutiny has not been forthcoming in accounting research, and this is partly due to the widespread, uncritical acceptance of empiricist epistemology. If one assumes (as many empiricists do) that theories can be divided into "normative" and "positive" frameworks, and that the verity of the latter can be established by merely consulting factual evidence, then the scrutiny of underlying values slips from explicit attention, returning covertly in the disguise of "facts" to participate in deciding what passes as "truth".

Voltaire and others warn us about the pre-theoretic role of values; they may foster a collec-

tive ideology for apologizing for a prevailing social order. "Order" may refer to the tyrannical and murderous regimes that Candide and Pangloss encounter during their adventures, or it may concern the social and economic relations between denizens instigated by accounting conventions and rules. In either case, theorizing may be qualified by our vision of things, and therefore this behoves us to interpellate the ideological precepts of our researches.

Using a very provisional, three-trait definition of ideology, some examples of accounting theorizing were reviewed for their ideological content. Agency Theory and Transaction Cost Theory were shown to exhibit naturalistic precepts that mystify the origins and motivations of theorizing, bolster the status quo by naturalizing the present, and extend a broad interpretative license to advocate-scholars engaged in distributional conflicts.

Recent accounting research has attempted to respond to such problems by exploring the interpenetration of accounting and the social relations of production (see, for instance, Armstrong, 1985, 1987; Berry *et al.*, 1980, 1985; Cooper, 1980, 1981, 1983; Hoogvelt & Tinker, 1978; Hopwood, 1985, 1987; Hoskin & Macve, 1986; Lehman & Tinker, 1987; Loft, 1986; Merino & Neimark, 1982; Knights, 1987; Knights & Willmott, 1983, 1985; Miller & O'Leary, 1986; Neimark & Tinker, 1986; O'Leary, 1985; Tinker, 1980, 1985; Tinker *et al.*, 1982; Whitley, 1986). These studies view accounting as a cultural and symbolic activity and, in keeping with their exploratory nature, they tend to use idiographic and diachronic research methods so as to give full vent to the socio-historical uniqueness and complexity of phenomena.

What distinguishes the contributions of this new literature are the reliefs chosen to highlight various aspects of accounting's presence. Thus, for instance, Armstrong (1985, 1987) uses inter-professional comparisons to emphasize the specific strategies pursued by the accounting profession in the struggle for managerial hegemony. Burchell *et al.*, (1980, 1985), Hopwood (1987), Hoskins & Macve (1986),

Lehman (1985), Neimark (1983) and Loft (1986) treat accounting, as a mutually constituted phenomena, that is continually displaced (and displacing) agonistic social relations.

This research complements the above by emphasizing accounting's involvement in cultural and symbolic (scientific) activity (Lecourt, 1981; Lehman, 1985; Lehman & Tinker, 1987). Historical factors are relatively underdeveloped in the present paper as compared with other works (cf. Burchell *et al.*, 1985; Lecourt, 1981; Lehman & Tinker, 1986). What is emphasized here are particular naturalizing tendencies that interpenetrate various sciences, and some of the institutional routes through which this interpenetration occurs. A more substantial study might begin by documenting such vehicles

(literary citations, faculty membership, supervisory and research affiliations, funding affiliations, etc.) as a way of investigating changes in contemporary accounting's regime of truth.

The aim of this paper was not to find accounting theory "guilty" of possessing ideological traits; rather, it sought to illustrate how we might explicate the assumptions hidden in theorizing, and re-evaluate whether they accord with a reconceptualization of our aims for research. The accounting literature has devised a range of dichotomies that inhibit such interrogations ("fact" and "value", and "normative" and "positive"); only by displacing such commitments are we able to reveal the partisan interests that they strive to secure, and reevaluate our association with them.

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## A NOTE ON MATCHING CONTROL SYSTEM IMPLICATIONS WITH ORGANIZATIONAL CHARACTERISTICS: ZBB AND MBO REVISITED\*

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### Abstract

The implementation of new control systems governed by a rational-technical logic often produces contrary responses due to the underlying value and belief structures lodged within prevailing control systems, task and hierarchy. This note empirically examines this discordance within the context of perceived managerial benefits to ZBB implementation. Several prescriptive implications are offered for the design of systems change.

Williams *et al.* (1985) examined the issue of the compatibility of ZBB with an established MBO system and reported results which were contrary to normative arguments put forward in the professional MBO and ZBB literature.<sup>1</sup> As Otley (1980), Hopwood (1978, 1983) and others have implied, the design and implementation of specific accounting control systems must consider the wider context of organizational control mechanisms. Accordingly, this paper extends the Williams *et al.* (1985) study to investigate the effects of task, hierarchy and systems differ-

### EXHIBIT 1. Dependent variables

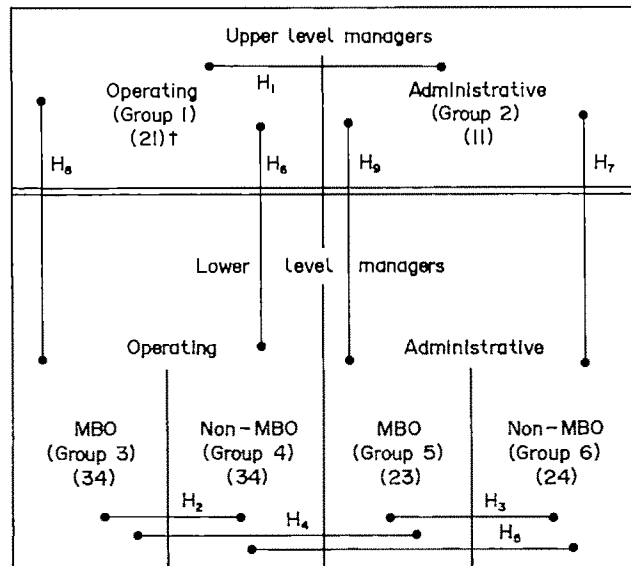
- 
- a<sub>1</sub> Clarifying responsibility, agreement on responsibilities, superior/subordinate communication, and agreement on end-results from decision unit.
  - a<sub>2</sub> Understanding end-results expected from decision unit.
  - a<sub>3</sub> Developing understanding of costs and benefits of performing incremental work through the process of developing decision packages.
  - a<sub>4</sub> Developing understanding of relative priority of incremental work through the process of developing decision packages.
  - a<sub>5</sub> Communication capability for recommending courses of action through the process of developing decision packages.
  - a<sub>6</sub> Understanding implications of alternative funding levels by reference to what can and cannot be done at each level of funding in the ranking process.
  - a<sub>7</sub> Effectiveness of performing functional steps, i.e. goal-setting, cross-impact analysis, decision package preparation, and ranking.
  - a<sub>8</sub> Preparing an effective departmental budget compared to previous methods.
  - a<sub>9</sub> Improving communications among lower, middle, and upper management.
  - a<sub>10</sub> Identifying and proposing improved ways of achieving decision unit objectives.
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<sup>1</sup> For specific references on the compatibility issue of ZBB and MBO see Dady (1979); Keys & Bell (1979); Bhada & Minnier (1980); and Migliore (1980).

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ences which may have an impact on the process of ZBB implementation in particular.<sup>2</sup> A specific concern is to unveil whether relationships among these three dimensions, *vis-a-vis* ZBB implementation, are dominated by norms of systems (i.e. MBO and ZBB)<sup>3</sup> and symbolic rational-

ity<sup>4</sup> or, by implication, hinge upon structures of meaning or constellations of shared beliefs which overarch the prevailing control system and organizational structure.<sup>5</sup> Figure 1 summarizes the framework for this study.<sup>6</sup>



\*Group legend:

- Group 1 — Higher level operating managers.
- Group 2 — Higher level administrative managers.
- Group 3 — Lower level operating MBO managers.
- Group 4 — Lower level operating non-MBO managers.
- Group 5 — Lower level administrative MBO managers.
- Group 6 — Lower level administrative non-MBO managers.

† Sample size.

Fig. 1. Framework for differentiation of groups.

<sup>2</sup> The organization, issues revolving around ZBB/MBO, subjects, time frame, and the reduced set of ten implementation variables (see Exhibit 1) from the total management hierarchy which form the basis of the present analysis, and the limitations noted are the same as the prior study.

<sup>3</sup> Excellent summaries of the rational calculus of MBO and ZBB can be found in Drucker (1954, 1976); De Woolfson (1975); Phyrre (1973); Knight (1979); and Dirsmith *et al.* (1980).

<sup>4</sup> For symbolic and ritualistic perspectives on ZBB see Wilkavsky (1975, 1978); Van Gunsteren (1976); Dirsmith & Jablonsky (1979); and Dirsmith *et al.* (1980).

<sup>5</sup> See, for a sampling, Hedberg (1981); Hedberg & Johnson (1978); Meyer (1982); Meyer & Rowan (1977); Ranson *et al.* (1982); Greenwood & Hinings (forthcoming); Starbuck (1983); Beyer (1981); Sproull (1981); and Weick (1979).

<sup>6</sup> In the Williams *et al.* (1985) study, groups 3 and 5 were merged together and groups 4 and 6 were merged together, and the resulting groups were compared with each other in the lower-level analysis. The latter two groups were next compared with upper level managers without differentiating task.

## THEORETICAL BACKGROUND

The theoretical starting point for this analysis is the internal *complexity* of organizations and the differences in behavior and beliefs that complexity produces. Complexity has three sources: the nature of the task performed, the existence of an hierarchy, and the kinds of systems used. Complexity creates distinct sub-units within an organization. This distinctiveness, in turn, produces differences in behavior and beliefs both through selective recruitment and by the nature of the work that each group performs.

In a recent important book on decision-making, Hickson *et al.* (1986, p. 45) have argued that "The division of labour in organizations creates sub-units of many kinds, by whatever name, so much so that organizations can be regarded as 'interdepartmental systems'." Morgan (1981) has gone as far as to suggest that organizations are so subdivided that they should be thought of as "schismatic systems" always about to disintegrate. The point is that organizations divide up their overall task on a *horizontal* basis among sub-units such as sales, R & D, production, accounting, etc. Past research has used this as a starting point for investigating within-organization differences (Dalton, 1950; Dearborn & Simon, 1958; Lawrence & Lorsch, 1967; Kochan *et al.* 1976). This research has consistently shown that the rational logic of task distribution reinforces within-organization differences in terms of behavior and beliefs.

One of the strongest differences to come from that literature is the distinctiveness of staff and line managers and the extent to which they engage in indeterminable conflicts with one another (Dalton, 1950; Browne & Golembiewski, 1974). Recently, Nystrom (1986) has used Mintzberg's (1979) distinction between middle-line managers and technostructure managers to compare beliefs about ways of organizing, incentives and motivation; he found significant differences between his two groups on all three measures.

While identification with a functional and occupational speciality may be the most important

basis for intra-organizational differentiation, organizations also differentiate along a *vertical dimension*. In particular, the vertical dimension in organizations distributes authority. Managers at different levels have different responsibilities. Miller *et al.* (1982) have shown how top executives differ from others in their view of control. Johnson *et al.* (1986) have shown strong differences by level in what managers regard as the most important performance factors, motivating factors and training needs.

The third dimension producing internal organizational complexity is that of *systems worked to*. Not only do organizational members do different things, they do them in different ways. Mintzberg's (1979) framework distinguishes between the operating core, technostructure, middle line, support staff and strategic apex. For the middle line, for example, the systems emphasis is on directly or indirectly supervising people who perform core work. Technostructure personnel, on the other hand, produce systems which design work processes, specify outputs or control worker's skills. Pfeffer & Salancik (1978) have suggested that the functional specialists classified by Mintzberg as the technostructure remove discretion and power from middle-line managers.

As March & Simon (1958) and Lawrence & Lorsch (1967) have pointed out, these structural features of organizations (horizontal, vertical and systems differentiation) interact with one another to sharply define group boundaries which then become boundaries of behaviours and beliefs. As Nystrom (1986, p. 812) puts it, "different beliefs might emerge if work roles mold work-related beliefs because these roles could differ substantially in different segments of an organization". The research cited in Nystrom's paper has clearly shown that working in different sub-units in an organization is related to differences in perceiving, in explaining, and in evaluating new ideas and practices.

The importance of establishing such differences is to then understand what is likely to happen with the introduction of a new system change, such as ZBB, into an organization. Any such system change will be evaluated in terms of

its contribution to the ongoing work of a sub-unit and the extent to which it meshes with existing systems. But the evaluation will be a compound of rational-technical reasoning and the particular sub-cultural values of the units. And the latter may well dominate over the former.

## HYPOTHESES AND RESULTS

To provide for a comprehensive testing of ZBB implementation that recognizes the dimensions of task, hierarchy, and systems, each hypothesis for the groups summarized in Fig. 1 was operationalized as follows: there is no difference in perceived benefits between managers. Analysis of all nine hypotheses was conducted by a parametric multivariate analysis of variance (MANOVA) using a discriminant function technique which controls for the interaction effects among the dependent variables. The results are summarized in Table 1.<sup>7</sup>

### *Horizontal analysis*

*Different task structures* ( $H_1$ ,  $H_4$ , and  $H_5$ ). The MANOVA tests for Hypotheses 1 and 5 are significant at  $p < 0.01$  and  $p < 0.03$ , respectively. For upper-level managers ( $H_1$ ) and lower-level non-MBO managers ( $H_5$ ), there is solid support for rejecting the null hypothesis. Thus, there are significant differences in perceived benefits between managers differentiated by operating and administrative technologies. The standardized canonical coefficients (SCC) indicate more precisely how these groups differed on a *relative* basis. Upper-level administrative managers tended to emphasize the resource allocation aspects of ZBB, while lower-level administrative non-MBO managers tended to emphasize the systems or global perspective. These findings are consistent with a rational-functional view of the compatibility of administrative technologies and

the technical specifications of ZBB. Moreover, there appears to be a concordance of the underlying value structures.

The MANOVA test for Hypothesis 4 is not significant and, therefore, the null hypothesis of no difference in perceived benefits between lower-level MBO managers must be accepted. A rational-technical perspective would predict that the perceived benefits of administrative MBO managers should dominate those of operating MBO managers, but this did not occur. MBO managers thus emerge as an exception in the task differentiation analysis, which implies that fundamental values underpinning the MBO system are at issue.

*Different systems* ( $H_2$  and  $H_3$ ). The MANOVA test for Hypothesis 2 is not significant; hence, the null hypothesis of no difference in perceived benefits between lower-level operating MBO and non-MBO managers must be accepted. However, the MANOVA test for Hypothesis 3 is significant at  $p < 0.01$  and this provides strong support for rejecting the null hypothesis of no difference in perceived benefits between lower-level administrative managers differentiated by the presence or absence of a MBO system.

These results are substantially contrary to the logic of rational ZBB and MBO literature(s). Argument from the former would view different systems as neutral in terms of ZBB's potential impact on *administrative* technologies. The results for Hypothesis 3 show otherwise. Also, this same literature would suggest little or no impact from ZBB implementation on groups of managers within *operating* technologies, different systems notwithstanding, and support for this is shown in the results for Hypothesis 2. However, both sets of results are at odds with rational MBO suggestions that an MBO structure would facilitate and benefit managers in the ZBB implementation process, regardless of task differences. Thus, these results appear to re-affirm the earlier

<sup>7</sup> In anticipation that the assumption of normality associated with the parametric tests might not hold for the data in the study, non-parametric multivariate Kruskal-Wallis (Katz & McSweeney, 1980) tests were conducted. In all cases, these tests yielded virtually the same significance levels as those of the parametric tests.

TABLE 1. Discriminant analyses results

| Independent variables | Horizontal dimension              |                                   |                                   |                                   |                                   |                                   | Vertical dimension                |                                   |                                   |       |
|-----------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-------|
|                       | $H_1$<br>Group 1<br>vs<br>group 2 | $H_2$<br>Group 3<br>vs<br>group 4 | $H_3$<br>Group 5<br>vs<br>group 6 | $H_4$<br>Group 3<br>vs<br>group 5 | $H_5$<br>Group 4<br>vs<br>group 6 | $H_6$<br>Group 4<br>vs<br>group 1 | $H_7$<br>Group 6<br>vs<br>group 2 | $H_8$<br>Group 3<br>vs<br>group 1 | $H_9$<br>Group 5<br>vs<br>group 2 |       |
| Dependent variables   |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                   |                                   |       |
| Goal setting:         | $a_1$                             | -0.70*                            | 0.65                              | -0.18                             | -0.05                             | -0.19                             | -0.31                             | 0.41                              | 0.52                              | -0.37 |
|                       | $a_2$                             | 0.22                              | -0.90                             | -0.69                             | -0.33                             | 0.28                              | 0.16                              | -0.67                             | -0.70                             | -0.49 |
| Resource allocation   | $a_3$                             | -0.16                             | -0.59                             | 0.51                              | 0.97                              | 0.22                              | -0.41                             | -1.14                             | 0.03                              | 1.01  |
|                       | $a_4$                             | 0.99                              | 0.05                              | 0.05                              | 0.44                              | -0.11                             | -0.46                             | 0.51                              | 0.26                              | -0.16 |
|                       | $a_5$                             | 0.93                              | 0.84                              | 0.03                              | -0.51                             | -0.36                             | 0.51                              | 0.05                              | 0.07                              | -0.33 |
|                       | $a_6$                             | 1.75                              | -0.14                             | 0.18                              | -0.17                             | 0.11                              | 0.44                              | -0.83                             | -0.34                             | 0.56  |
| Systems perspective   | $a_7$                             | -1.27                             | 0.14                              | -0.33                             | 0.23                              | -0.99                             | 1.55                              | 0.97                              | -0.92                             | -1.32 |
|                       | $a_8$                             | -0.11                             | -0.13                             | 0.04                              | -0.86                             | 0.58                              | 0.31                              | 0.63                              | -0.18                             | -0.01 |
|                       | $a_9$                             | -0.28                             | 0.11                              | 0.05                              | 0.27                              | 0.27                              | -0.74                             | 0.63                              | 0.50                              | 0.25  |
|                       | $a_{10}$                          | -0.33                             | 0.46                              | 1.10                              | 0.59                              | 0.59                              | -0.57                             | -0.33                             | 0.77                              | -0.88 |
| Group centroids       |                                   | -0.83                             | -0.45                             | -0.88                             | -0.27                             | -0.57                             | 0.65                              | 0.64                              | -0.55                             | -0.87 |
|                       |                                   | 1.58                              | 0.45                              | 0.81                              | 0.40                              | 0.78                              | -1.06                             | -1.45                             | 0.90                              | 1.82  |
| Chi-squared           |                                   | 21.92                             | 11.48                             | 22.79                             | 5.29                              | 19.76                             | 25.99                             | 19.72                             | 19.99                             | 26.63 |
| Level of significance |                                   | 0.01                              | 0.32                              | 0.01                              | 0.87                              | 0.03                              | 0.00                              | 0.03                              | 0.03                              | 0.00  |
| Percent of variance   |                                   | 100.0                             | 100.0                             | 100.0                             | 100.0                             | 100.0                             | 100.0                             | 100.0                             | 100.0                             | 100.0 |
| Canonical correlation |                                   | 0.76                              | 0.41                              | 0.65                              | 0.32                              | 0.56                              | 0.65                              | 0.70                              | 0.58                              | 0.79  |

\*Standardized canonical coefficients.

interpretation that deep-seated values embedded within the MBO system are problematic to the introduction of ZBB.

#### *Vertical analysis* ( $H_6$ , $H_7$ , $H_8$ and $H_9$ )

The MANOVA tests for Hypotheses 6, 7, 8, and 9 are significant at  $p < 0.00$ ,  $p < 0.03$ ,  $p < 0.03$ , and  $p < 0.00$ , respectively. These results show strong support for rejecting each null hypothesis. More interesting is that the group centroids from Table 1 are larger for both groups of lower-level non-MBO managers relative to upper-level managers ( $H_6$  and  $H_7$ ) whereas the group centroids are lower for both groups of MBO managers relative to upper-level managers ( $H_8$  and  $H_9$ ).

These findings are not in harmony with rational-technical expectations grounded in the functionalist ZBB literature which would assume that existing control systems and hierarchy are neutral factors in ZBB implementation. Specifically, this literature would not predict the discovery of any significant differences in Hypotheses 6–9. Furthermore, the results from Hypotheses 8 and 9 are incongruent with functionalist arguments on the complementary nature of MBO and ZBB — arguments which would predict the opposite results to those found in the vertical analysis.

This leads to a possible symbolic interpretation for explaining the results, premised on the notion that top management imported ZBB in an effort to preserve or enhance its social and economic image with both internal and external constituents. This stance implies that top management would not consciously privilege any interest group among the three dimensions and would be, *de facto*, indifferent to the outcome of implementing ZBB.

Three conditions could support a state of indifference: (1) all four null hypotheses are accepted; (2) all four hypotheses are rejected and the group centroids for all lower-level groups are larger than the upper level groups; or (3) all four hypotheses are rejected and the group centroids for all lower-level groups are smaller than the upper-level groups. None of these conditions occurred. Hence, there is additional sup-

port for inferring that differing ideological values and beliefs grounded in the interpretive scheme of the MBO and ZBB systems are critical factors in these results.

## SUMMARY AND CONCLUSIONS

In summary, managers' perceived benefits from ZBB implementation vary in the following ways:

(1) They are enhanced in administrative technologies relative to operating technologies at both authority levels, contingent on the absence of a MBO system. In these circumstances, the underlying value structure appears to be consonant with the task and systems structure.

(2) They are neutralized between task technologies, given a prevailing MBO system. Here, there is an apparent discordance between the underlying value structure of task and the control systems.

(3) They are neutralized between MBO and non-MBO systems, given an operating task environment. By inference, there seems to be conflict in the interpretive schemes embedded in the systems structure.

(4) They are enhanced in a non-MBO system relative to a MBO system, given an administrative task environment. In this instance, values appear to be in disaccord.

(5) They are enhanced in both upper-level task technologies relative to lower-level MBO task technologies and *vice versa* for lower-level non-MBO task technologies. The values overarching the systems structure appear to be in disharmony with both task and hierarchy.

Viewed collectively, these results suggest that managerial responses to the implementation of a new budgeting system are not driven solely by the internal technological or hierarchical structure of an organization or by the technical specifications governing the *modus operandi* of the new system and its linkage with prevailing control systems. We would argue that, additionally, the introduction of a new control system requires consonant interpretive schemes across task, hierarchy and control system dimensions.



The major managerial implication is to avoid a Type 1 error by not mistaking the solution for a problem (Hofstede, 1981) and abandoning a control system on the basis of rational-functional arguments rather than searching for ideological underpinnings in the conjunction of control systems, tasks and authority relationships.

Control system design and change requires

the creation of coincident meaning from coincident value interpretations (Gray *et al.*, 1985) which permeate an organization's structural dimensions. Achieving such congruence necessitates a continual recalibration to match changing organizational conditions (Kerr, 1983) — to create, in other words, a blend of the rational and intersubjective.

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**ACCOUNTING IN THE  
PEOPLE'S REPUBLIC OF CHINA**

## WESTERN MANAGEMENT ACCOUNTING AND THE ECONOMIC REFORMS OF CHINA

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### Abstract

As China has experimented with economic reforms during the last decade, new management systems designed to facilitate these reforms have been implemented. This paper shows how the recent adoption of Western management accounting methods by many state-owned Chinese enterprises has played an integral and demonstrable role in the new management systems and in the economic, social and political reforms of the country.

Following China's 1949 Communist revolution and the formation of the People's Republic of China, a centrally planned and controlled socialist economy was established. Under this socialist system, all profits or losses from state-owned enterprises (business units) belonged to or were subsidized by the state, and state grants were usually provided for equipment replacement and expansion. Consequently, managers of government-controlled state-owned enterprises lacked decision-making autonomy and shouldered no economic responsibility for the performance of these enterprises.

In 1979, China began the latest series of economic reforms, which included experimentation and evaluation of production and management methods. This "trial and error" policy meant that an idea, generally originating from the central government, could be tried in selected districts. If the idea fails, changes are made and another experiment is implemented. Successful experiments become the basis for formulating new national policies and regulations. Although not all successful ideas become national policy, those selected are the basis for regulations that must

be implemented by all enterprises throughout the nation.

One of the first experiments initiated by the People's Congress of the People's Republic of China permitted pilot state-owned enterprises to retain some profits and become more autonomous, policies designed to spur initiative and improve productivity. This "Expansion of Autonomy Program" was so successful in reducing "abuses and imbalances" attributable to centralization, that the program was expanded to several thousand key enterprises within one year (China's New Economic Development Trends, 1980).

The program has had a dramatic effect on China's business environment. Some competition among enterprises is now encouraged, and industrial goods and supplies can now be purchased at industrial exhibitions (Zhang, 1980). Thus, many enterprises in China are permitted to develop their production plans, sell their products, and negotiate prices with buyers, so long as they meet the state-imposed production plan. Enterprises participating in this program, however, still lack *economic responsibility* for capi-

tal investments and any operating losses are still covered by the state (Mun, 1981, p. 32).

China has also recently experimented with *increased economic responsibility*, in which a few enterprises are treated as independent economic entities. These enterprises use the national economic plans as guidelines in developing market-oriented production schedules. These enterprises retain profits for development, collective welfare, and workers' bonuses and pay taxes on income, productive equipment, and working capital. Government subsidies will not cover losses and they must solve their own efficiency problems.

Table 1 illustrates China's three management systems now used in state-owned enterprises. Management's economic responsibility under each management system is shown, as is the applicable type of accounting "responsibility center." The three management systems parallel closely the three types of responsibility centers in Western management accounting: cost center, profit center, and investment center. Accounting techniques have played an integral role in the implementation of the new management systems and, as a result, are helping improve production efficiency.

## DEVELOPMENT OF MANAGEMENT ACCOUNTING IN CHINA

There were relatively few large industrial enterprises in China before the 1949 revolution. Consequently, accounting methods, for the most part, were rather simple, employing basic small business double-entry book-keeping methods adopted from the West in the 1920s.

### *Introduction of cost center accounting*

The establishment of the People's Republic of China triggered the development of many more large industrial enterprises. Under the centrally-planned economy, the government administered the national economy as if it was a single, huge, industrial corporation which did not let operating divisions sell products or develop production plans. Production and cost targets were set through state agencies. Although profit was one of the targets, it was only in name since all prices were set by the state.

During the 1950s many enterprises emphasized the "work-team" concept. Work-teams were cost centers at the lowest level. These teams or groups of workers were responsible for achieving their planned production, cost and so

TABLE 1.

|                                    | Management system        |                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | State-administrated      | Increased autonomy                                                                                                                                                                                                   | Increased responsibility                                                                                                                                                                                                                                                                                                                            |
| Decision-making authority          | None in functional areas | 1. Production planning<br>2. Portion of profits retained<br>3. Purchase of industrial goods at exhibitions<br>4. Bonuses for workers<br>5. Price negotiations<br>6. Sales to domestic buyers<br>7. Development funds | 1. Market-oriented production planning<br>2. Profits retained<br>Purchase industrial goods at exhibitions<br>4. Bonuses for workers<br>5. Price negotiations<br>6. Direct sales to overseas buyers<br>7. Co-production with other enterprises<br>8. Sales and purchase contracts negotiated with other enterprises<br>9. Election of plant managers |
| Management economic responsibility | None                     | None                                                                                                                                                                                                                 | Full                                                                                                                                                                                                                                                                                                                                                |
| Accounting responsibility center   | Cost center              | Profit center                                                                                                                                                                                                        | Investment center                                                                                                                                                                                                                                                                                                                                   |

called "profit" targets. The enterprises themselves were not cost centers. Top management of these enterprises were only responsible for production quotas, not financial considerations.

During the 1960s the "internal profit system" used in many enterprises was implemented to increase the cost and "profit" awareness of those responsible for the plants or factories, the second level of management within large enterprises. The problems or shortcomings associated with this system were never published in accounting or economic journals, because, like many other government policies during that time, the success or failure of the system was a sensitive issue closely related to the fundamental principles of the planned economy.

Many of the management accounting methods applicable to cost centers as described in Western management accounting textbooks were modified and used by these enterprises; these techniques are still used by many Chinese enterprises. Such principles as standard costing, inventory planning and control, and responsibility accounting for cost centers have been used widely in Chinese industrial enterprises since the early 1950s. These principles were originally adopted from Soviet accounting techniques, since China's centrally-planned economic system closely resembled that of the U.S.S.R. These similarities meant that the accounting controls, which suited China's new social and economic environment, could be implemented rapidly. Since the Soviet Union had adopted methods used in the most developed countries, particularly the United States, when it developed its planning and accounting system in the 1920s and 1930s, the current Chinese cost center accounting and control techniques are similar to those used by the United States and other Western countries.

In a centrally-planned economy, accounting practices must be standardized to ensure unified reporting, cost analysis, and performance measurement. State-owned enterprises must comply with the relevant accounting and reporting regulations. However, there were many reports that financial statements prepared to comply with state regulations were not based on actual finan-

cial performance data. Unskilled accounting personnel contributed to this problem, and to the wide variation in the quality of accounting.

### *Introduction of profit center accounting*

When many state enterprises were given the authority to sell at least a portion of their products in response to market forces and to retain a portion (around 20%) of profits to benefit workers, accounting techniques to facilitate this profit-oriented "increased autonomy" management system were needed. The Chinese could not model these accounting techniques on the Soviet system, since profit centers were more applicable to Western management accounting methods. The proclamation of an "open to the outside world" policy in 1978 let the Chinese study, translate, and publish Western management accounting methods, primarily from American textbooks and accounting journals. Many of these new accounting methods were quickly endorsed by China's National Accounting Association, many provincial accounting associations and various state ministries, bureaux and administrative corporations. The new concepts were immediately implemented, at least as far as allowed by the education and technical limitations of enterprise managers and accountants. Educational programs and seminars were initiated, and the curricula of management and accounting schools were modified.

Management accounting concepts dealing with cost behavior were most readily applied in the Chinese enterprises. Concepts like variable and fixed costs, contribution margin, cost-volume-profit analysis, flexible budgets, variable costing, and methods of service department cost allocations based on different rates for fixed and variable cost elements were foreign concepts to Chinese accountants and managers. Of these methods, it would appear that the contribution margin concept and the cost-volume-profit analysis have been the most extensively applied. The other concepts have been applied in varying degrees depending upon the expertise of accounting personnel and the industry.

Fundamental to the use of any of the profit center accounting methods is the economic determination of "profit." In a free-market economy, prices are subject to supply and demand. Hence, profit is the result of revenue earned and expenses incurred. Since profit is necessary to generate capital and provide a return to investors, profit will greatly influence management effectiveness. The situation in China, however, is quite different.

Although the central government of China has brought about many economic reforms during the last decade, the free-market is far from operational. Prices for most commodities are not determined by supply and demand, but are set by the government. One of the major efforts the government is now undertaking in economic reform is to adjust the "price structure" (the relative price of one commodity to another). Presently in some industries, the unreasonably high margin between the government selling price and the cost of production ensures very high profit margins; in other industries, the profit margins are unreasonably low. As a result, it is very difficult to establish equitable tax and employee bonus rates between industries, and even between different enterprises in the same industry.

*Profit retainment system.* About 1980, in Shanghai, the largest industrial city in China, most industrial enterprises were experimenting with the motivational effectiveness of a new profit retainment system that allowed some profits to be retained for worker bonuses and other benefits. The profit retained depends on the profit earned the previous year, plus the increase in profit for the current year. Rates applicable to each industry, and sometimes even to each enterprise within an industry, are set by the government for each year. Because it supposedly is more difficult to increase profits in subsequent years, the rate applicable to the current year's increase is sometimes more than double the rate applied to the previous year's profit. To illustrate, suppose:

$P_0$  = previous year's profit      100,000 yuan  
 $P_1$  = current year's profit      115,000 yuan

$R_0$  = set rate for retainment of previous year's profit      20%

$R_1$  = set rate for retainment of increase in current year's profit over previous year's profit      50%

Then, the amount of profit retained for the current year is

$$\begin{aligned} &= P_0 \times R_0 + (P_1 - P_0) \times R_1 \\ &= Y100,000 \times 20\% + (Y115,000 - Y100,000) \times 50\% \\ &= Y27,500. \end{aligned}$$

This profit retainment system was viewed as an effective way to allocate profit to enterprises and its use spread throughout China. For four or five years, enterprises in almost every province in the country used this system. But like other systems tried, its disadvantages became increasingly apparent. Enterprises that strived to be profitable one year often found it very difficult to increase profits the following year. Enterprises with advanced technology and management had less potential to improve their profit in subsequent years than did those that were less developed, and vice versa. In China, the practice was called "whipping the fast cattle." When two or three cattle pull one plow, it is the slowest that should be lashed, not the fastest.

*Tax to substitute profit retainment system.*

Beginning in 1985, a new profit distribution system was implemented in many provinces called the "Tax to Substitute Profit Retainment." Actually, it is simply an income tax system. Prior to 1985, income taxes were only levied on foreign companies or joint-ventures with foreign investors. Under this new system even state-owned enterprises must remit about 50% of their profits in the form of an income tax; the remaining profits are retained by the enterprises. Previously profit was regarded as state-owned; the new concept means profits belong to the enterprises, which owe income tax to the state.

The implementation of this income tax system is more than just a change in terminology. Under the new tax system the previous year's profit supposedly was to have no bearing on the amount of tax due or the amount of profit re-

tained by an enterprise, thus eliminating the practice of "whipping the fast cattle." Nevertheless, there are still problems with different profitability levels between different industries and enterprises due to government set prices. To address this problem, an "adjustment tax" is being levied on some industries and enterprises to help equalize the amount of profit retained by similar sized enterprises with different profitabilities. The adjustment tax rate, however, is based in part on the amount of the previous year's profit. As long as commodity prices are predominately government controlled, an adjustment tax seems necessary to bring greater equity to the new tax system. A fully satisfactory way to determine the adjustment tax rate has yet to be determined.

#### *Introduction of investment center accounting*

The investment center concept and optimization of investment returns are still largely unknown in China. For years, the Chinese have been principally concerned with quotas and measures of production performance. Profit is largely viewed as any savings from the predetermined production costs. Capital investment in individual enterprises, including the modernization of productive equipment, is largely determined and controlled by the government. Increases in profit due to increased investment cannot generally be attributed to the efforts of enterprise management. With fixed production quotas, managers sought to meet those quotas and "profit" goals regardless of inventory and asset investments. To most Chinese managers, concepts such as return on investment (ROI), residual income, and time value of money have little meaning.

*Capital tax experiment.* To encourage better management of invested capital, a few pilot enterprises, beginning in 1979, were given "increased responsibility," which meant that these enterprises had to be concerned with costs, profits and investments in fixed assets and working capital, as well as production and sales. These enterprises had to evaluate their overall economic performance since the government would not

cover losses or inefficiencies; enterprises had to pay taxes on income, productive equipment supplied by the state, and working capital. Enterprises that efficiently used fixed assets and working capital were assessed lower taxes, and thus earned more profit. The fixed assets acquired through the enterprise's own development fund, or outside investment, were exempt from this tax on fixed assets, a factor that encouraged pilot enterprises to acquire fixed assets that would generate the highest productive returns. For example, the Shanghai Diesel Engine Factory established a 20% minimum rate of return on fixed assets. Any proposed fixed asset not projected to meet this return on investment would not be purchased from the state or other manufacturers (Tao & Wong, 1981). Similarly, required return on additional working capital was 11%.

The use of these economic performance measures prompted some of these "increased responsibility" enterprises to offer to return some of their less efficient equipment and supplies to the state. This was in stark contrast to most other enterprises that were unconcerned with excessive investments in equipment; many enterprises even tried to stockpile large quantities of supplies (Mun, 1981, p. 40).

*Special Economic Zones and cities.* Four Special Economic Zones were also established in 1979 as laboratories in China's "increased responsibility" experiments. These low-tax free-enterprise areas are permitted to utilize foreign investment and technology. Early in 1984, 14 coastal cities were selected as export-oriented industrial centers and magnets for foreign investment and high technology. Late in 1985, after a high-level, six to eight month reassessment of the special economic zones and cities found that progress was disappointing, the government announced that it must retreat from what it now viewed as an unrealistic plan to simultaneously develop so many areas. Instead, four of the 14 cities with the infrastructure, material and human resources required to meet ambitious economic development goals, were allowed to continue experimentation. Consequently, increased responsibility (investment



center) enterprises exist in Shanghai, Tainjin, Dalian and Guangzhou. Increased responsibility enterprises in these four cities are generally export-oriented and have substantial foreign investment.

#### ECONOMIC BENEFITS OF THE NEW MANAGEMENT SYSTEM

Shortly after the implementation of these new management systems, empirical studies verified that economic performance improved in those state enterprises operating with "increased autonomy" and "increased responsibility."

Statistics in an article by Lin Sum, "State Enterprises Should Adopt the Profit Retention Approach" (1979) indicate that, after only one year, production in "increased autonomy" (profit center) enterprises exceeded that in traditional "state administered" (cost center) enterprises by 14%. The difference in profits was 45%. Likewise, a study in the *People's Daily* (1980) reported that "increased responsibility" (investment center) enterprises produced 18% more goods, 23% higher profits, and paid 17% more to the state than "increased autonomy" (profit center) enterprises. These productivity gains have contributed to China's 8% average rate of real economic growth during the last few years.

#### CONCLUSIONS

In the eight years since Deng Xiaoping has be-

come the top leader, China has moved steadily toward being a more profit-oriented, market-focused consumer society. The national policies of "enlivening the domestic economy" and "open to the outside world" have let Chinese accountants implement many Western management accounting methods. These methods are now helping to change decision-making and productivity in China, and their continued application will play an integral role in economic reforms.

China's economic reformation still faces many dilemmas. For the most part, the government is asking enterprises to be more autonomous in decision-making, yet only a small portion of the profit is left for the enterprise after income taxes and adjustment taxes. Consequently most enterprises must still rely on government funds for major capital requirements. Even if the enterprise has enough retained profits for minor projects, the project must be approved by the supervisory administrative institution of the enterprise.

The government protects nearly all enterprises from bankruptcy as a means to maintain high employment and ensure social stability. The government recognizes that monetary incentives motivate workers and improve productivity, yet views excessive productivity as a threat to full employment, and views too big a disparity in wages as an undesirable social injustice, both of which could precipitate social instability. It is uncertain whether China will continue these economic reform programs, and how it will deal with these dilemmas.

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## CHINESE ACCOUNTING SYSTEMS AND PRACTICES\*

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### Abstract

Recognising that relatively little is known of Chinese accounting in the West, this article aims to provide an introduction to the role of accounting in China, its regulatory environment, Chinese accounting methods and recent attempts to improve the conceptual understanding of accounting in China. Throughout the description and analysis, attempts are made to relate the technical nature of Chinese accounting to its specific socio-economic context.

Owing to political, socio-economic and cultural, as well as linguistic, reasons, there is very little awareness of Chinese accounting in Western countries. Not only has very little analysis of it appeared in the literature but there also are few insights into the basic approaches used and their rationales and consequences. Three well-known international accounting textbooks do not mention the area at all (Arpan & Radebaugh, 1981; Choi & Mueller, 1978; Nobes & Parker, 1981).

Recognising this gap, the following discussion aims to provide a survey of the development of accounting systems and practices, from after the People's Republic of China was founded in 1949 until the present day, with particular emphasis being given to current accounting approaches. Consideration also is given to those features of accounting that are characteristic of state-owned enterprises in China. More specifically the paper will cover the following topics: (a) the role of state enterprise in China's economy; (b) the accounting law and regulations; (c) the functional framework of Chinese accounting; (d) the theory of Chinese accounting; and (e) Chinese accounting methods. It concludes with a summary and an analysis of future prospects.

### STATE ENTERPRISE IN CHINA'S ECONOMY

The structure of the Chinese economy can be divided into four sectors; (a) the state sector; (b) the collective sector; (c) small private units which are dealing with individual businesses; and (d) the joint venture sector which consists of those enterprises set up by both domestic and foreign investors. Since most Chinese enterprises are owned by the state on behalf of the Chinese people, and therefore play a predominant role in the Chinese economy, it is natural for our analysis to focus on this kind of enterprise.

#### *Organisational structure*

State enterprises consist of both commercial and industrial units which produce or provide services in accordance with the central plan. They are either directly controlled by the central government or mandated by local governments. The former are normally called "state enterprises" (Kuo-Yin Chi-Yeh), whilst the latter are referred to as "local enterprises" (Kuo-Yin Ti-Fung Chi-Yeh) (Shanghai Institute of Finance and Economics, 1980, p. 5). The activities of each state or local enterprise must comply with

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the requirements laid down in the national economic plan and should relate closely to those of other economic units.

### *The nature of state enterprises*

The nature of state enterprises can be summarized as follows (Shanghai Institute of Finance and Economics, 1980, pp. 6-7):

(1) All factors of production such as plant, equipment, machines, and raw materials are owned by the state, but state enterprises are delegated to use and manage them.

(2) The types of product and the orientation and development of state enterprises must comply with the needs of socialist modernization and the promotion of economic prosperity. State enterprises have to obey those fundamental principles, policies, and regulations which are designed to enable them to fulfil their tasks. Within this context, state enterprises have relative independence to make decisions.

(3) Both purchases of main raw materials and sales of finished goods should be in accordance with the national plan and comply with specific regulations.

(4) In accordance with the Accounting Law, state enterprises have the obligation to pay taxes to the state.

(5) State enterprises are generally delegated the authority to recruit and dismiss workers.

### *The managerial framework*

The typical framework of management of a state enterprise can be simply described as "three levels of management and two levels of economic accounting" (San-Ji Kuan-Li Re-Ji Hei-Shuan). At the top management level are the directors, a chief accountant, a chief engineer and a chief economist, as well as those executives working in a variety of functional departments. At the middle managerial level of the enterprise are the chief staff of the workshops, the engineers. Accounting clerks and those responsible for work in small groups are categorized as being at the grassroots level. Normally, each state enterprise has an independent accounting department dealing with daily transactions and events, and in addition, each workshop has a few

accounting staff measuring, recording and analyzing costs and expenses incurred in the production process.

## ACCOUNTING LAW AND REGULATIONS

The Accounting Law of the People's Republic of China was adopted on 21 January, 1985 at the Ninth Session of the Standing Committee of the Sixth National People's Congress. This is the first accounting law since the liberation in 1949. The reasons for the promulgation of the Accounting Law were several. First, the influence of the Cultural Revolution on the management of state enterprises had not been completely removed. As a result, some illegal financial activities such as corruption, embezzlement and speculation had caused the state significant losses. Second, a great number of practitioners were unqualified and as such could not execute adequate accounting supervision and managerial control. Third, prior to the new law, accountants had little or even no protection when they wanted to do their duty by fighting illegal or criminal activities. In this context it should be noted that some authorities at various levels not only interfered with accounting practices, but also abused and took revenge on accounting officers and staff.

In a Chinese context, it has been proved time and again that it is necessary to formalize the fundamental principles of accounting in a legal form in order to strengthen and improve accounting. There is now no doubt that the accounting law will play a significant role in motivating accounting staff to exercise their rights to perform their duty to protect socialist public assets and to improve economic management, as well as to enhance the economic efficiency of enterprises. Given the importance of the new accounting law, it is useful to provide a brief description of its evolution and development.

### *Historical perspective*

In 1949 the Ministry of Finance had intended to unify the variety of accounting systems and practices inherited from the old society, not

least in order to enhance the legitimacy of the accounting function. However, because the new state had only just recovered from the effects of war and intended to restructure the Chinese economy at that time, it was impossible for the Ministry to lay down a complete set of accounting laws as quickly as they had intended. As a first step, the Ministry of Finance decided to formulate some new accounting regulations. Just one year later two such important accounting regulations were promulgated: the General Budgetary Accounting System for Administrative Departments of Central Government, and the Unit Budgetary Accounting System for Local Government, which together were designed to unify the accounting practices in both central and local government. In November 1951 the Ministry of Finance was authorized to set up these uniform accounting systems. It sponsored the first national conference on financial accounting and management, the purpose being to discuss the uniform chart of accounts and the form and pattern of accounting statements.

At the beginning of the first five year plan in 1953, the Ministry convened another national conference to further survey the possibility and feasibility of establishing uniform accounting systems and regulations. After the conference, a number of new regulations were promulgated, for example, the Uniform Approach to Cost Calculation in State Enterprises, the Chart of Accounts and the Form of Accounting Statements Used by State and Private Enterprises, and the Simplified Accounting System used in Local Enterprises.

From 1961 to 1965 three further very important accounting regulations were formulated by the Ministry of Finance: the Accounting Procedures of State Enterprises, several regulations concerning the Chief Accountant in Industrial and Transport State Enterprises, and the Regulation concerning Accountants' Duties and Rights. At that time, the political situation was conducive to the formulation of accounting laws. However the ten year Cultural Revolution disrupted the progress of this work, and no more regulations were published during that period except for the Procedure of Accounting Work in State

Enterprises.

### *Contents of the Accounting Law*

The contents of the Accounting Law can be summarized as follows:

(1) It identifies the functions and sphere of responsibility of accounting officers and staff of enterprise units. Article 22 of the Accounting Law states that:

The main functions of accounting officers and accounting staff are: (a) accounting calculation pursuant to Chapter II of this law; (b) accounting supervision pursuant to Chapter III of this law; (c) formulation of specific procedures to handle accounting matters in their respective units; (d) participation in formulating economic plans and the examination and analysis of results of the execution of budget and financial plans; and (e) conducting other accounting matters (1985, p. 6).

(2) The legal liability of accounting officers and staff are also identified. In order to tighten accounting management and supervision, the Accounting Law has strictly stipulated the liabilities and duties placed on accounting officers and staff as part of the implementation of the uniform accounting system and other relevant regulations. Articles 25, 26 and 27 state that if accounting officers or staff violate these provisions of the law, they can be punished in accordance with the law, either by administrative sanction or by criminal prosecution if the cases are sufficiently serious.

(3) Specification of the legal liability and obligation of hierarchical administrative executives. This is one of the main concerns of the law. Administrative executives of units not only have the responsibility to assist accounting officers and staff to implement and comply with the law but they also have a legal obligation to obey it themselves. If they violate this law they too can be punished accordingly.

(4) The legal rights of accounting officers and staff in their work are protected by the law. It stipulates that nobody is allowed to abuse or take revenge on accounting staff, and it particularly emphasizes provisions for their appointment and removal:

Accounting staff may be appointed or removed in accor-

dance with the stipulations of the realm of jurisdiction over cadres. The appointment and removal of chief accounting officers and accounting staff in charge of enterprises or non-business units should have the approval of the superior administrative unit. If an accounting staff person who is loyal to his duty and adheres to principles is mistreated, the superior administrative unit should instruct the unit in which he works to correct the treatment. If an accounting staff person proves himself unsuitable for accounting work due to negligence or betrayal of principles, the superior administrative unit should instruct the unit in which he works to dismiss him (Accounting Law, 1985, p. 6).

(5) The scope of the law. Article 2 of the Accounting Law requires that all state enterprises, state non-business units, government agencies, social organizations, and the armed forces should observe the law when dealing with accounting matters.

## THE FUNCTIONAL FRAMEWORK OF CHINESE ACCOUNTING

### *Structure of Chinese accounting principles*

Up until 1985, there was only one professional accountancy institute, named the Accounting Society of China. It is an academic association and is very similar to its counterparts, the British Accounting Association in the U.K. and the American Accounting Association in the U.S.A. The society was originally formed in the 1950s, but was suspended during the period of the Cultural Revolution. However it was reorganized in 1980 and has now become one of the largest societies, with about 40 branches throughout the country. The organizational structure of the Accounting Society of China is illustrated in Fig. 1.

The main goals and tasks of the Society are

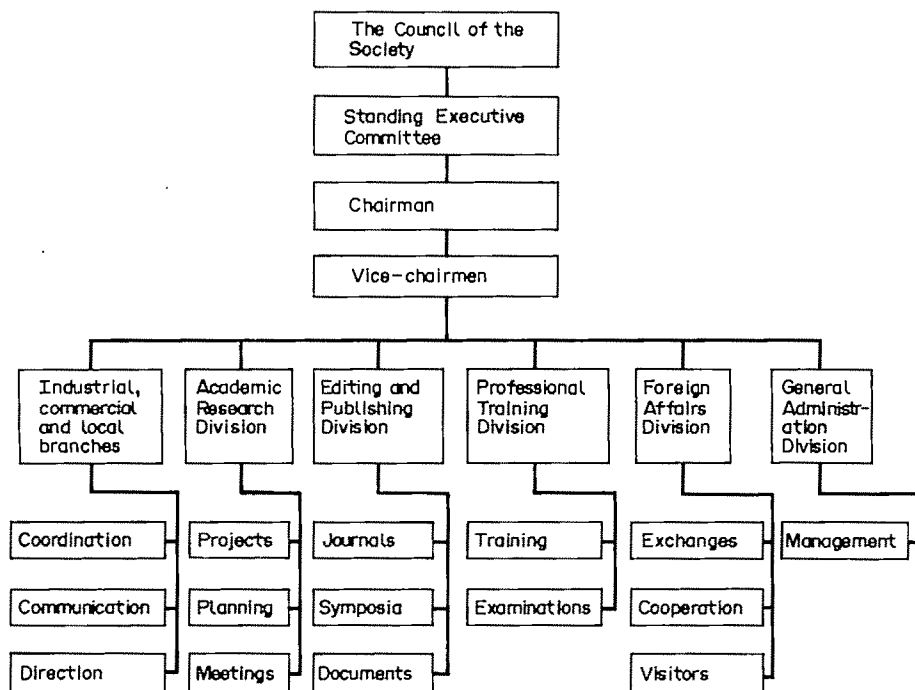


Fig. 1. The organisational structure of the Accounting Society of China.

classified as follows (Yang Ji-Wan, 1985):

(1) To design the long-term research planning for directing and motivating academics and practitioners to contribute their greatest efforts to the establishment and development of a set of coherent and consistent accounting theories and methodologies taking Chinese characteristics into account.

(2) To sponsor and organize national conferences and various professional meetings for further discussing, debating, exploring and resolving important contemporary problems.

(3) To edit and publish professional journals, magazines and diverse research symposia.

(4) To arrange and organize various kinds of training programmes in order to suit the different needs of accounting staff with different knowledge levels.

(5) To further develop the mutual relationship between the Chinese accountancy profession and its Western counterparts, and to establish permanent cooperation and academic exchanges with international accountancy organizations.

China has not, until very recently, had a professional accountancy body similar to such overseas organizations as the Institute of Chartered Accountants in England and Wales or the American Institute of Certified Public Accountants in the U.S.A. However the increasing demand for qualified accountants to conduct audits and to provide consultancy services, a demand that itself results from the reform of the Chinese economy and the implementation of the "open door" policy, has resulted in the central government paying great attention to this matter. As a consequence, in July 1986 the State Council promulgated a new regulation called "The Regulation Concerning Certified Public Accountants of the People's Republic of China" The regulation is designed to strengthen the control of CPA certification and accounting firms.

Firstly, the regulation clearly defines the qualifications needed in order to become a CPA. It stipulates that only those candidates who have higher education degrees and at least three years practical experience after passing the uniform examination can obtain a CPA certificate and be registered as a CPA. In the meantime, however, accounting professors or associate professors, research fellows and those who have higher education degrees and more than 20 years experi-

ence can be excused from the examination. On the latter basis there are now about 1000 practicing CPA's in China.

Secondly, the regulation states that only a CPA firm can be authorised to engage in accounting and auditing business. As soon as an accountant is professionally qualified as a CPA, he or she must join an accountancy firm. There is no allowance for CPAs to work independently. If a CPA cuts him or herself off from an accounting firm, he or she will lose the title of CPA at once.

The regulation also identifies the present range of a CPA's functions, the operating rules for practice and certain ethical requirements.

Finally, the regulation delegated the authority to CPAs to form their own professional body — the Chinese Institute of Certified Public Accountants. So now the establishment of such an organization is on the agenda. It should be emphasised, however, that the administration of CPA certification, the organization of the uniform examinations and the registration of both CPA firms and CPAs themselves are the responsibility of the Ministry of Finance at the central level and finance bureaux on the local level, such as in the provinces, autonomous regions and municipalities, although always under the control of the Central Government.

Whilst these new procedures are being established, the Accounting Society of China, together with its branches through the country, has sought and arranged a variety of channels to train accounting officers and staff in response to a very real pressure stemming from societal need. As a consequence, currently hundreds of thousands of accountants are being trained in universities, colleges and vocational schools, or through university instruction on television, correspondence courses, advanced education courses and various types of evening classes.

### *The Chinese uniform accounting system.*

The uniform accounting system used by industrial and commercial enterprises was revised and improved in 1981, on the basis of the practical experience and comments collected from a variety of industrial and commercial units. In comparison with the former accounting system,

several amendments were introduced into the new system.

***Simplification of the chart of accounts.*** Fifty accounts were redesigned by the Ministry of Finance. These can be classified into two categories: fund applications (Tzu-Jin Yin-Yong) and fund sources (Tzu-Jin Lei-Yuan). Thirty of the redesigned accounts belong to the former category and the rest to the latter. For convenience, all fund application accounts are given a general title of "assets", while fund sources are termed "funds". Among these accounts, 16 were introduced for the first time in order to further strengthen the economic management of state enterprises, to improve accounting measurements, to tighten the control of the cost of products, and to provide accounting information more economically, efficiently and effectively.

***Introduction of reference numbers.*** In order to facilitate the identification of the nature and categories of accounts and to encourage the wider application of computer systems in accounting practices, three-digit code numbers were designed by the Ministry of Finance.

***Stability and flexibility.*** In order to maintain the stability and consistency of the accounting information used in national planning and macro-economic control, the Accounting Law has required that state enterprises, non-business units, collective enterprises, governmental bureaux and agencies etc., should all follow the uniform accounting system. However, because different units face different business environments in different industrial and commercial sectors, the Accounting Law also has allowed the functional departments of the State Council and the financial bureau and agencies of local government to formulate certain supplementary regulations in order to modify or simplify the uniform accounting system, so long as these actions do not violate the fundamental principles of the Accounting Law. When these units make such amendments, they must report them to the Ministry of Finance and send copies to the relevant superior administrations for filing (Ac-

counting Law, 1985, p. 2).

Accordingly, although industrial enterprises need to comply conscientiously with the uniform accounting system and regulations, they are now allowed to select certain accounts in accordance with the nature, the scope and the features of their business activities and it is not necessary for them to use all the accounts listed in the chart of accounts.

In addition, state enterprises are permitted to design additional accounts without violating the uniform accounting system and regulations, and without influencing the needs for the measurement and aggregation of financial information for national planning and budgeting decisions (Ministry of Finance, 1985).

#### ***Form and content of accounting statements***

Chinese accounting statements can be divided into three categories according to their economic nature:

- (1) statements reflecting the fluctuations of fund applications and fund sources;
- (2) statements reflecting the cost of main products; and
- (3) statements reflecting the performance of an enterprise.

In accordance with the accounting law and regulations, industrial enterprises should submit to the superior administrative departments monthly, quarterly or annually;

- (1) a balance sheet;
- (2) an income statement;
- (3) a statement of cost of commercial products;
- (4) a statement of the unit cost of main products;
- (5) a statement of the total cost of goods produced;
- (6) a statement of goods sold and sales revenue;
- (7) a statement of fixed assets and current funds;
- (8) a statement of profit distribution.

In order to support the reform of the Chinese economic structure and effectively improve national statistics, state enterprises are also required to prepare a statement of the net value

of industrial products, which will be mentioned later.

Among these statements, the most important are the balance sheet, the income statement, and the statement of the unit cost of main products.

**Balance sheet.** In comparison with its Western counterpart, there are significant differences in the form, structure and contents of the Chinese balance sheet. The first relates to the theory that total fund applications must equal total fund sources. In a broad sense, the meaning of fund applications is very similar to that of assets, and fund sources might be seen as being comparable to the concepts of equity and liabilities that are used in Western countries. From the perspective of political economy, however, equity in Western countries represents the private ownership interest and the claims of creditors. In China, in contrast, total fund sources are owned by the state on behalf of the people. In order to emphasize the socialist nature of state owned enterprises and to avoid any misunderstanding that might occur because of the use of Western accounting terminology, the Ministry of Finance decided to use the fund terminology rather than assets and equity. The second difference relates to the structure of the balance sheet. Whilst the accounts of fund applications are shown on one side and the accounts of fund sources appear on the other side, the balance sheet itself is based on the principle that specific funds can be allocated for specific purposes. For example, fixed fund sources cannot be used for the purchase of raw materials, nor can current fund sources be used to pay for the acquisition of fixed assets. As a result, the balance sheet can also be divided into three sections on both sides: fixed assets, current assets and assets for specific uses on one side and fund sources from the state and retained profits, current liabilities and funds for specific purposes on the other side. An illustrative example is shown in Appendix 2.

**Income statement.** The structure of the income statement is roughly the same as that of Western countries. It starts from the sale of products and ends with a figure for net profits. But

there are a number of specific regulations for preparing this statement which introduce a number of important differences. Sales revenue, for example, is recognized at the time of cash receipt or the date of delivering goods. Moreover, state enterprises are permitted to offset their short-term loans, which are used to improve productivity or replace existing fixed assets, directly against their operating profits before these are assessed for tax. Finally, certain supplemental information has to be attached to the income statement in order for superior authorities to assess the performance of the unit. Examples include the ratio of the total profits to the total fund sources and a detailed list of non-operating income and expenses. An example of the main statement is given in Appendix 3.

**Statement of the unit cost of main products.** This statement mainly reflects changes in the cost of main products. In it, the cost of products are divided into two categories: the cost of comparable products and the cost of non-comparable products. The distinguishing attributes relate to the structure, the content and the quality of the products. The reduction of the costs of comparable products is usually seen as one of the main indicators in assessing the performance of state enterprises.

## THEORY OF CHINESE ACCOUNTING

So far China does not have a set of consistent and coherent accounting theories for the guidance of practice and for the resolution of new practical problems. There are a number of reasons for this:

(1) The influence of the traditional thought of a small-scale rural economy, and in some cases, even a total lack of knowledge of modern management science and technology, have caused many administrators to pay little attention to the economic management of state enterprises, or to their accounting practices. In their minds, accounting remains a relatively insignificant practice.

(2) The influence of the economic and politi-



cal system in China. Since China was a centrally planned economy, the whole national economy was treated as a single economic entity before the recent reform of the economy. The state set the production targets for the enterprises, distributed their products, assigned their personnel, and allocated their supplies and equipment, as well as taking over their profits and covering all their losses. Thus, the executives of state enterprises were acting as representatives of the state. Their main responsibility was to fulfil the tasks assigned to them by the hierarchical administration without much concern for the more efficient use of resources. So there was no incentive for them to make use of accounting information for decision making.

(3) The influence of the Soviet accounting model. Because of the mutual friendship between China and the Soviet Union in the 1950s, the influence of the Soviet model was not only manifest in the Chinese political system but also had a significant impact on economic policies. As the Soviet Union was a centralized economy, great emphasis was placed on the need for more detailed and concrete regulations, which in turn, gave rise to the processing of accounting information. China consequently lacked the built-in sensitivity in its accounting structure that would enable it to respond to the rising complexity of its economic environment (Gorelik, 1981, pp. 147–148).

In order to overcome these shortcomings, the Accounting Society of China and the Ministry of Finance have now sponsored an important project aimed at establishing a set of socialist accounting theories, taking account of China's characteristics and placing an emphasis on efficiency and the benefits to be achieved from it.

In order to satisfy the need for the development of Chinese accounting thought, the Accounting Society of China has designed several criteria for examining and assessing whether or not accounting theories and methodologies produced by both academics and practitioners are suitable for the Chinese socio-economic environment. These criteria can be summarized in the following manner: the creation of accounting concepts and principles must (a) not only

conform to the traditional accounting experience and practical reality but also take account of those problems recently faced in practice; (b) combine the reform of traditional accounting theories and methodologies with the development of the Chinese economy so that they are responsive to the needs of improving economic management under socialist modernization; (c) be directed by the demands of dialectical materialism and historical materialism and be based on Marxist political economics, whilst at the same time absorbing from Western countries those new ideas and thoughts that are both suitable and feasible for Chinese circumstances.

#### *Changes in accounting thought*

In a behavioural sense, accounting is generally perceived as an environmentally determined activity. In its long history accounting continually has reacted to, and indeed was a product of, the environment in which it functioned. As the economic environment has changed and socio-cultural development has occurred, the society's needs for accounting information have changed and expanded as well. In this sense accounting must change as environmental circumstances change (Gilling, 1976, pp. 60–61).

Since the liberation, China's economy has changed continuously. This has had a significant influence on accounting practice and particularly on the development of Chinese accounting thought, motivating accountants to search for the essence and substance of a responsive and relevant accounting. As a result of these changes, Chinese accountants want to characterize Chinese accounting explicitly and precisely to give an in-depth description of its nature and objectives. When compared with the development of the economic structure, it can be seen that the changes in thought have gone through three stages: (a) a view of accounting as a means; (b) a view of accounting as an information system; and (c) a view of accounting as accounting management.

*Accounting as a means.* As has been stated already, the impact of the Soviet economic model on China's socialist economic construction was

very significant during the post liberation period. In accordance with the Soviet economic model, accounting must be congruent not only with socialist ideology, but also with economic policy as expressed in both macro- and micro-economic plans so as to further the growth of the peoples' well-being on the basis of the steady, progressive development of the national economy. Following such a guideline, the main purposes of accounting can be perceived as providing useful information for the national economic planning process and helping in the evaluation of economic performance. On this basis some accounting academics and practitioners argued that accounting could be viewed as a means by which the state could conduct "socialist reproduction". This view has been referred to in the following terms:

Socialist accounting is one of the means of dealing with economic management under a socialist system. It is also an approach, through recording and examining in terms of money, to the supervision and evaluation of units' (e.g. enterprises, non-business units, public organizations, etc.) economic activities and financial situation in the processing of socialist expanded reproduction (Tan Hui, 1963, p. 25).

*Accounting as an information system.* In the late 1970s, just after the Cultural Revolution, China began to shift its focus to economic construction through economic reform and the implementation of an "open door" policy. Many accounting books and magazines of Western countries were introduced into China at this time, together with some new concepts and methodologies such as opportunity cost, marginal analysis, the time value of money, cost-benefit analysis, etc.

These new ideas and methodologies appear to provide helpful and useful ways for Chinese state enterprises to improve their management and make better decisions for future production. Chinese accountants are therefore beginning to pay more and more attention to the work of their Western colleagues. As a result, influences coming from Western countries are gradually outweighing the influence of the Soviet Union. Although the fundamental nature and objectives of

Chinese accounting remain unchanged, many Chinese accountants would now not only like to incorporate these new thoughts into accounting practice but also try to break through the boundaries of vagueness that have characterized accounting thought to date. As one has stated:

Accounting is an information system. It provides useful information through recording, measuring, analyzing, and examining economic activities of an enterprise as a whole, for predicting and evaluating the performance of enterprises (Guo Jia-Shu, 1981).

*Accounting as accounting management.* With the further development of the reform of the economic structure, more and more Chinese authorities have recognized that accounting is playing a significant role in improving the management and increasing the efficiency and benefits of state enterprises. At the same time, accounting staff are no longer satisfied with only providing information and have decided to involve themselves in the execution of business management. Accordingly a new concept of "accounting management" has been developed (Yang Ji-wan & Nian Da-wu, 1980). This viewpoint argues that accounting is one of the most important management activities rather than merely being an information system that provides users with a way of understanding the financial situation and assessing the performance of state enterprises. According to this emergent perspective, accounting should play an active and positive function in forecasting, budgeting, evaluating, analyzing as well as controlling so as to strengthen management control and increase the contribution to socialist modernization. A number of advocates therefore have tried to offer a more precise definition of the nature and objectives of Chinese accounting. Professor Lou's interpretation can be seen as being representative of such thinking:

Accounting is a managerial activity; it is designed to measure, analyze and examine the quantitative phenomena of the economic activities of an entity and briefly create financial and cost information on which the management can rely to make decisions and to perform its accountability functions and responsibility so as to control the process of production and obtain the maximum efficiency and benefits (Lou Re-Xing, 1984).

### *Principles of accounting*

Because of the strict implementation of the uniform accounting system and regulations formulated by the central government, Chinese accounting academics and practitioners previously paid little attention to the independent establishment of socialist accounting principles. But this does not mean that there are no accounting principles embodied in the work they have done. Although accounting principles have not yet been explicitly conceptualized in the Chinese accounting law and regulations, quite distinct ideas are nevertheless there.

Generally, China applies internationally accepted accounting principles to the governance of its accounting practice. For example, the principles of the accounting entity, periodicity and going concern are contained in the accounting law. State enterprises prepare their financial statements on a historical cost basis, using accrual and consistency principles. However China does not adhere to the principle of conservatism. The reasons for this are as follows: (a) because the price system is strictly controlled by the central government, market price fluctuations are not significant; (b) in accordance with the Chinese accounting law, no reserves are allowed to offset losses of bad debts; (c) the uniform accounting regulations have stipulated that inventories must be valued on the basis of historical cost, and no other methods of valuation are permitted to be used. All losses of bad debts or downward revaluations (e.g. of inventories) have to be deducted directly from current operating income after being approved by superior authorities.

In recent times many Chinese accounting researchers have turned their attention to the classification of accounting principles. A number of comments and suggestions concerning what are seen to be unique Chinese principles have been made. These opinions can be summarized as follows (Lou Re-Xing *et al.*, 1982):

(1) *The principle of serving the plan.* Since the Chinese economy is a planned economy, the processes of production, circulation, distribution and consumption are subject to central

planning and direction. Because of this the plan of an enterprise is an organic component of the entire national economy, so all the economic activities of an enterprise must be carried out in accordance with the general plan. Accounting, as a managerial activity, should be used to control and supervise the implementation of the plans of state enterprises.

(2) *The principle of policy.* In order to control the structure and the development of the Chinese macro-economy, central and local governments initiate a variety of both general and specific policies. State enterprises must strictly follow these policies in dealing with their economic activities. Accounting, as a means of financial management, can be used to reflect whether or not enterprises have complied with these policies.

(3) *The principle of overall interest.* Because China is a planned economy, the whole country can be regarded as a single conglomerate enterprise. As a result, the interest of an enterprise should not be contradictory to the overall interest of the state. It must be borne in mind that the partial interest of an enterprise must not be against the overall interest when dealing with accounting measurement, analysis and explanation.

(4) *The principle of control by the masses.* The theoretical foundations of Chinese accounting are based on Marxism. The labour theory of value is a fundamental cornerstone of Chinese accounting practices. It says that labour creates value and the means of production belong totally to the people, so all state enterprises are controlled by the central government on behalf of the people and the labour masses are the real masters of the state enterprises. There is no doubt that the labour masses are interested in the managerial condition of enterprises as well as the results of their performance. Accounting practitioners therefore should take their interest into account and provide information to them so as to satisfy their needs.

(5) *The principle of identifying specific funds for specific purposes.* As has been mentioned previously, state enterprises have three types of funds: a fixed fund source, a current fund source and a specific fund source. Each of these has been designed for a specific purpose and it cannot be used otherwise, so that their utilization can be controlled and supervised, and their effectiveness and efficiency can also be assessed. With such an aim in mind, accounting practice should reflect the actual use of a fund so as to facilitate the evaluation of the performance and the financial position of the enterprise as a whole.

#### *Net value of industrial products*

Previously, one of the most important indicators used by central and local authorities to assess the performance of state enterprises has been the total value of industrial products. But there are several weaknesses with this measure. One of them is that it includes the transferred value of intermediate products, or in other words, it results in duplications in the calculation of value. In order to reflect actual national income, the Ministry of Finance has decided to require state enterprises to report the net value of industrial products. The definition of net value of industrial products is, in an intuitive sense, quite similar to what in Britain would be called: "the national income or new industrial product generated by industrial enterprises within the process of production" (McLeay, 1984). But the theoretical basis of calculating the net value of industrial products in China differs significantly from that in Britain. The Chinese calculation is based on the Marxist theory of value. Following Marxist guidelines, only labour which is directly involved in the processing of production or providing services can be recognized as contributing to the net value of industrial product (the added value) (National Statistics Bureau, 1981, pp. 2-8). Thus, the incomes earned by the owners of capital and land, as well as the income earned by non-industrial sectors, are not included in this figure.

Practically, there are two methods of calculating the net value of industrial products. One is

the production method, and the other is the distribution method.

Its calculation in terms of the production method is simply described by a formula as follows (National Statistics Bureau, 1981):

$$\begin{array}{rcl} \text{Net net value} & & \text{gross value of} \\ \text{industrial} & = & \text{industrial} \\ \text{products} & & \text{products} \\ \text{(current price)} & & \text{(current price)} \end{array} \quad \begin{array}{rcl} & & \text{total cost of} \\ & & \text{physical} \\ & - & \text{consumption} \\ & & \text{(current price)}. \end{array}$$

As the formula implies, there are two steps in calculating the net value of industrial product. The first step is the calculation of the total value of industrial products which is represented by a formula:

$$\begin{array}{l} \text{Total value of} \\ \text{industrial products} \\ \text{and services} \end{array} = \sum_{i=1}^m Vi \times Pi + \sum_{j=1}^n Vj \times Pj$$

$Vi$  and  $Vj$  represent the quantity of product ( $i$ ) and the quantity of service ( $j$ ), and  $P$  represents the current market price of each product or service respectively. The second step is the calculation of the total cost of physical consumption, which can be related to the statement of total production cost. But at the same time, some adjustments are necessary. First, physical consumption such as of raw materials, electric power and fuel, depreciation etc., should be identified within the total cost of production. Second, overhead should be divided into two categories: for physical and for non-physical consumption.

In contrast to the production method, the distribution method only focuses on the distributable income which is represented by a formula as follows (National Statistics Bureau, 1981):

$$NV = Ps + T + W + Wf + I + O.$$

*NV*: net value of industrial products; *Ps*: total sales profit, if all products produced in the period of time concerned are sold; *T*: total tax payable due to the sale of the total products produced in the period of time concerned; *W*: total wages, bonuses and allowances earned by workers in the period of time concerned; *Wf*: fund of

welfare calculated in accordance with a certain percentage of the total wages mentioned above; *I*: interest incurred by the enterprise; and *O*: other gains.

It should be mentioned that the figure of profit potentially earned cannot be obtained directly from the income statement because, on the one hand, a certain portion of profit is derived from sales of previously finished products, and on the other hand, there are some unrealized profits, which will be realized in the near future, remaining as part of inventories. Thus, a profit recalculation is necessary. Normally, this figure can be obtained by using a simple method which assumes that the sales prices of products produced in previous and current years are stable:

$$Q = CP \times SP/CS$$

*Q*: potential sales profit if all products produced in the period concerned are sold; *CP*: total cost of products produced in the period concerned; *SP*: sales profit actually earned in the period concerned; *CS*: cost of goods sold.

In other words, the figure of profit potentially earned can be obtained by multiplying total cost of products produced in the period concerned by the ratio of the sales profit to the cost of goods sold.

Commercial tax payable represents the tax charge on all products produced in the period concerned, even though some of them have not been sold at the end of the period. A certain proportion of the tax charge from goods sold but produced previously should not be included in this figure.

## CHINESE ACCOUNTING METHODS

In a practical sense, accounting methods are the concrete means and measures for arriving at the fundamental objectives of accounting. As previously mentioned, the socio-economic environments are very different in China and in Western countries. Because of this Chinese accounting methods have their own characteristics.

### *Fixed assets and depreciation*

According to the state industrial enterprises'

Accounting Regulations, fixed assets managed by state enterprises are divided into seven categories: (a) for operating; (b) not for operating; (c) leased; (d) waiting for installation; (e) disposable; (f) idle equipment; and (g) land (Ministry of Finance, 1985, p. 12).

The values of fixed assets are primarily based on historical cost or acquisition cost unless a revaluation is approved by the superior authority. Other than through such an approved revaluation, state enterprises are not allowed to adjust the gross book value of their fixed assets except in the following circumstances:

(1) if the original assets are upgraded by the addition of new parts and technologies;

(2) disposal of some portion of the original fixed assets; or

(3) to correct mistakes in the recording of the cost of acquisition.

The funds for state enterprises acquiring fixed assets are appropriated by the state in terms of national fixed funds when the state enterprises are established. If state enterprises plan to extend their production or replace their existing old machines or equipment, they might obtain some financial aid by (a) applying their retained profit or reserved development fund; (b) using accumulated replacement funds; (c) borrowing from the bank; or (d) issuing business debentures or shares. The first three approaches can be decided by the state enterprises without the approval of superior authorities but the fourth method needs the approval of the superior authorities and any other relevant agencies.

The straight-line method is mainly used by state enterprises in calculating depreciation, and the rates of depreciation are strictly regulated by the state in accordance with the attributes and useful life of the fixed assets.

### *Accounts receivable and payable*

In China, the central banking system plays a significant role in supervising the circulation and handling of all domestic financial dealings. All purchasing and selling transactions must be executed through the system on a cash basis. Due to this, large amounts of accounts receivable and accounts payable do not normally re-

main in the accounts of state enterprises at the year end. In addition, the maximum cash transaction allowed is 100 yuan. Payments exceeding this limit must be dealt with via the banking system (Ministry of Finance, 1985, p. 15). Normally, enterprises must pay invoices promptly within a few days unless they do not have enough money to cover the expenditure.

As part of the reform of the Chinese economy, especially as a result of the introduction of new sales channels and methods, some types of commercial goods are now allowed to be purchased on an installment basis.

### *Inventory*

State enterprises usually use the planned price method to calculate and record the value of inventories on the basis of historical cost. The difference between real market prices and the planned prices are posted to a specific account named "variances from planned cost of stores". As the cost of products is calculated at the end of a period, certain proportions of these variances have to be added to the cost of products based on the proportion of stores being used. In accordance with the Accounting Law, LIFO, the current cost method and the method of the lower of cost or market price are not allowed to be used.

### *Taxation*

Instead of turning over the profit earned to the state, state enterprises are now required to pay different kinds of taxes such as a business income tax, an income adjustment tax, a progressive tax of bonuses, etc., to the state (De Wulf, 1985). The income tax was introduced in 1983, and was fully implemented in state enterprises by the end of 1984. The rate of income tax has been fixed at 55%. As price distortions affect enterprise profitability more often than managerial efficiency, an adjustment tax has been applied to the after-tax profit in order to bring the profit more or less in line with those retained before the introduction of the income tax.

On the basis of the principle of "work as you can, payment for work done", the wage policy for state enterprises also has undergone rapid change. In 1979, state enterprises began to give

bonuses to more efficient workers. These bonuses initially could not exceed 2.5 months' basic wages. Now that limit has been removed, but a progressive tax is to be levied on the part of the bonus exceeding the 2.5 months' basic wage level.

### SUMMARY AND PROSPECTS

China is a socialist country. Most Chinese enterprises are owned by the state on behalf of the Chinese people. The nature, objectives and functions of such state enterprises are basically determined by the political and economic policies of the Chinese socialist system. Within the enterprises there is a hierarchical system of management and the accounting system enables the executives to supervise and control the process of production and fulfil the tasks assigned to them by central or local governments.

The Chinese Accounting Law has played a significant role in encouraging and motivating Chinese accounting officers and staff to exercise their rights and carry out their responsibilities. It has not only identified the functions and legal liabilities of accounting officers and staff but it also has stipulated the precise legal obligations of authorities at different levels to protect the legal rights of accounting officers and staff in their work.

In accordance with the Chinese Accounting Law, the Ministry of Finance is delegated the authority to formulate a uniform accounting system and a variety of regulations in response to the need for consistent and comparable information to be used in the macro-control of the economy, strategies of proportional development, the rational allocation of scarce resources as well as in the assessment and evaluation of performance between state enterprises. In addition, other functional departments of the State Council, financial bureaux and agencies of local government, and even state enterprises themselves are now allowed to make some modifications, simplifications and/or formulate certain supplementary regulations for adapting accounting to their own specific circumstances and needs.

Generally, China applies internationally accepted accounting principles. In addition, however, there are several unique principles which take account of the Chinese socio-economic environment. These have been classified as follows: the principle of serving the plan; the principle of policy; the principle of overall interest; the principle of control by the masses; and the principle of indicating specific funds for specific purposes.

The continuous development of the Chinese economy and the consequent demand for a set of consistent and coherent accounting theories have had a significant influence on the development of Chinese thought. Academics and practitioners are now keen to absorb those new ideas and thoughts which they believe to be suitable and feasible for Chinese circumstances. No longer satisfied with their recent function of merely handing up financial reports to superior authorities, they are now shifting their attention more and more to management decisions in terms of planning, budgeting, evaluating, analyzing, forecasting and controlling.

Since the theoretical foundation of Chinese accounting is Marxism, the calculation of the net value of industrial product (value added) differs from that in Western countries. Two methods, namely production and distribution, have been outlined, both of them only considering the labour which is directly included in the processing of production or the production of services. Such differences serve to emphasize that Chinese accounting methods are products of the Chinese socio-economic environment.

With the decision on the Reform of the Economic Structure, announced on 20 October, 1984, China significantly consolidated and accelerated a process of restructuring the economy in order to put herself on the path of sustained, balanced and rapid development. This economic reform, recently implemented in urban areas, includes the following targets (De Wulf, 1985):

(1) To expand the scope of guidance planning and narrow that of mandatory planning.

(2) To increase the use of macro-economic policy instruments such as prices, taxation, cre-

dit, interest rates, profits and wages, and put relative emphasis on the market function.

(3) To give greater autonomy to, and boost the vitality of, state enterprises, by allowing them to run their businesses as an independent economic entity and encouraging them to assume more responsibility for their own results.

The growth in independence and responsibility of the state enterprises and the changes in the political and economic environment have had a considerable influence on Chinese accounting practices, and more and more Chinese people have recognized that accounting is now playing a significant role in socialist modernization. Yao Yi-Lin, the Vice-Prime Minister of China, has stated that:

Accounting is essential work in the national economy. If an enterprise does not attach importance to accounting, it will inevitably suffer a defeat in economic competition and sustain a negative influence on the living standards of the workers in the enterprise. In such case, the leaders of the enterprise must be discharged from their posts (Yao Yi-Lin, 1984).

However, the rigidity of the Chinese economic system, the mandatory and detailed nature of its accounting regulations, as well as the lack of a set of complete and coherent accounting theories and methodologies, has made it difficult for Chinese accounting to adapt to the changing economic environment. This inevitably reduces the potential of Chinese accounting for management control and decision making both in terms of the macro and the micro economies. As a result, Chinese accountants are now facing a great challenge if they are to play their role in economic restructuring. The programme for the development of Chinese accounting theory and methodology sponsored by both the Ministry of Finance and the Accounting Society of China is designed to encourage and motivate Chinese accounting academics and practitioners to contribute greater efforts to the progress of Chinese accounting. In addition, the "open door" policy has also provided quite a lot of opportunities for Chinese accountants to learn from their colleagues in Western countries, as well as encouraged them to cooperate more closely with

foreign accounting institutes and organizations There is no doubt that Chinese accounting will in dealing with international accounting affairs. progress and develop in the near future.

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## APPENDIX 1. CHART OF ACCOUNTS

| Applications of funds |                                            | Sources of funds |                                                         |
|-----------------------|--------------------------------------------|------------------|---------------------------------------------------------|
| 101                   | Fixed assets                               | 401              | Capital fund                                            |
| 102                   | Unwritten-off cost of capital construction | 402              | Accumulated depreciation                                |
| 104                   | Long term investment                       | 403              | Current fund                                            |
| 111                   | Purchases                                  | 405              | Investment from outside                                 |
| 112                   | Raw materials                              | 411              | Loan for capital construction                           |
| 121                   | Fuel                                       | 421              | Bank loan for current fund                              |
| 123                   | Containers                                 | 430              | Sales receipts received from instalment delivered goods |
| 124                   | Low-price and perishable articles          |                  |                                                         |
| 129                   | Variances from planned cost of stores      | 431              | Accounts payable                                        |
| 131                   | Stores in outside processing               | 432              | Accrued payroll                                         |
| 135                   | Overstocked inventories                    | 439              | Other payables                                          |
|                       |                                            | 441              | Prepaid expenses                                        |
| 141                   | Manufacturing cost                         | 452              | Tax payable                                             |
| 142                   | Unfinished products                        | 452              | Unsubmitted depreciation                                |
| 143                   | Supplementary expenses                     | 453              | Capital expense payable                                 |
| 144                   | Overhead                                   | 455              | Unsubmitted profit                                      |
| 145                   | General and administrative expenses        |                  |                                                         |
| 151                   | Deferred expenses                          | 461              | Tax relief                                              |
| 152                   | Deferred taxation                          | 491              | Unrecorded properties                                   |
| 159                   | Expenses for maintenance                   |                  |                                                         |
|                       |                                            | 501              | Funds for specific purposes                             |
| 161                   | Finished goods                             | 521              | Appropriation for specific purposes                     |
| 166                   | Delivered goods                            | 531              | Loan for specific purposes                              |
| 167                   | Instalment delivered goods                 |                  |                                                         |
| 171                   | Cash                                       | 541              | Payables for foreign technologies introduced            |
| 172                   | Cash in bank                               | 550              | Payables for energy and transportation construction     |
| 179                   | Other monetary assets                      |                  | Special accounts payable                                |
| 181                   | Accounts receivable                        |                  |                                                         |
| 186                   | Compensatable losses                       |                  |                                                         |
| 189                   | Other receivables                          |                  |                                                         |
| 191                   | Unsolved losses of properties              | 601              | Sales                                                   |
|                       |                                            | 611              | Profits                                                 |
| 201                   | Cash deposit for specific purposes         |                  |                                                         |
| 202                   | Materials for specific purposes            |                  |                                                         |
| 203                   | Cost of specific projects                  |                  |                                                         |
| 204                   | Treasury bonds                             |                  |                                                         |
| 211                   | Special accounts receivable                |                  |                                                         |
| 311                   | Distributable profits                      |                  |                                                         |

## APPENDIX 2. BALANCE SHEET

| Name                                            | Time              |               | Sources of funds                                 | Monetary unit: Yuan |               |
|-------------------------------------------------|-------------------|---------------|--------------------------------------------------|---------------------|---------------|
|                                                 | Beginning of year | End of period |                                                  | Beginning of year   | End of period |
| <b>Fixed assets</b>                             |                   |               | <b>Fixed funds</b>                               |                     |               |
| Fixed assets at cost                            |                   |               | State fixed fund                                 |                     |               |
| less: accumulated depreciation                  |                   |               | Enterprise's fixed fund                          |                     |               |
| Fixed assets-net value                          |                   |               | Adjustable fixed fund                            |                     |               |
| Unwritten-off expenses for capital construction |                   |               | Loan for construction                            |                     |               |
|                                                 |                   |               | Investment from outside                          |                     |               |
| Subtotal                                        |                   |               | Subtotal                                         |                     |               |
| <b>Current assets</b>                           |                   |               | <b>Current fund</b>                              |                     |               |
| Approved currents assets                        |                   |               | State current fund                               |                     |               |
| Inventories:                                    |                   |               | Enterprise's current fund                        |                     |               |
| (1) raw materials                               |                   |               |                                                  |                     |               |
| (2) fuel                                        |                   |               | Short term loan:                                 |                     |               |
| (3) containers                                  |                   |               | (1) loan for production                          |                     |               |
| (4) low-price and perishable items              |                   |               | (2) loan for technical innovation                |                     |               |
| (6) undelivered materials                       |                   |               | (3) loan for settlement                          |                     |               |
| Cost of production:                             |                   |               | Accounts payable                                 |                     |               |
| (1) processing of product                       |                   |               |                                                  |                     |               |
| (2) deferred expenses and taxes                 |                   |               | Other payables                                   |                     |               |
| Cost of products:                               |                   |               | Tax payable                                      |                     |               |
| (1) finished goods                              |                   |               |                                                  |                     |               |
|                                                 |                   |               | Unsubmitted depreciation                         |                     |               |
| Overstocked materials                           |                   |               |                                                  |                     |               |
| Cash                                            |                   |               | Tax relief                                       |                     |               |
| Cash in bank                                    |                   |               |                                                  |                     |               |
| Accounts receivable                             |                   |               |                                                  |                     |               |
| Other receivables                               |                   |               |                                                  |                     |               |
| Subtotal                                        |                   |               | Subtotal                                         |                     |               |
| <b>Specific assets</b>                          |                   |               | <b>Specific funds</b>                            |                     |               |
| (1) Specific materials                          |                   |               | (1) Appropriations for specific purposes         |                     |               |
| (2) Specific deposits                           |                   |               | (2) Loans for specific projects                  |                     |               |
| (3) Cost of projects                            |                   |               | (4) Payables for foreign technologies introduced |                     |               |
| (4) Treasury bonds                              |                   |               |                                                  |                     |               |
| Subtotal                                        |                   |               | Subtotal                                         |                     |               |
| Total                                           |                   |               | Total                                            |                     |               |



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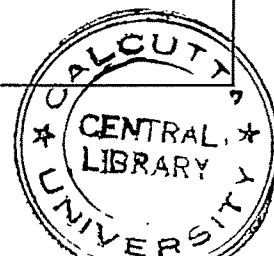
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## THE EFFECT OF PARTICIPATIVE BUDGETING ON JOB SATISFACTION AND PERFORMANCE: ROLE AMBIGUITY AS AN INTERVENING VARIABLE\*

ROBERT H. CHENHALL  
*La Trobe University*

and

PETER BROWNELL  
*Macquarie University*

### Abstract

The results of studies into the effects of participative budgeting have been equivocal. This study seeks to explain the process by which participation in budget setting affects managers' performance and job satisfaction. A model is developed to show how role ambiguity acts as an intervening variable in the link between participation and outcome criteria. Empirical results indicate that budgetary participation acts indirectly, via role ambiguity, to influence job satisfaction and performance.

An issue which has occupied the attention of accounting researchers is the question of the effects of budgetary participation on managerial attitudes and behaviour. Little closure, however has been achieved on this question. Studies by Cherrington & Cherrington (1973), Milani (1975), Kenis (1979) and Chenhall (1986) found that budgetary participation improved job satisfaction, whereas Brownell (1981, 1982) found no such association. With regard to performance, results range from strong positive effects of participation on performance (Bass & Leavitt, 1963; Brownell, 1982), to unclear or insignificant effects (Milani, 1975; Kenis, 1979), to even negative effects (Bryan & Locke, 1967; Stedry, 1960).

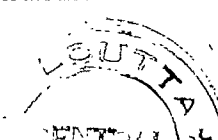
Two possible explanations for these inconsistent findings can be offered. First, it is conceivable that participation's effect on outcome

criteria can be positive in some circumstances and negative in others. The failure to carefully account for the circumstances in which participation "works", versus those when it does not, would explain the variety of results. This view, referred to as the *contingency model* view, maintains that the values taken on by certain variables (contingency variables) determine whether participation is positively related to outcome criteria, or not. In the words of Hopwood (1976):

The practical problem is in trying to identify which conditional factors determine the wider impact of a particular type of participative management programme (p. 79).

A second view, and the one examined by this study, is that the equivocal results are due to the fact that, theoretically, the focal variables (participation and outcome criteria) are not directly related. That is, there is no theoretical argument

\*The authors acknowledge the useful comments of participants in workshops at the University of Queensland, and La Trobe, Monash, Macquarie, James Cook and Griffith Universities. Two anonymous reviewers are also thanked for their comments.



which can support simple, *direct* effects of participation on job satisfaction or performance. Instead, the effects of participation, if any, are *indirect* and are conveyed to outcome criteria via some intervening construct which links the variables. This view is referred to as the *intervening variable model*, which, while contrasting with the *contingency model*, should be viewed as entirely complementary to it.

The paper reports the results of an empirical examination of the effects of role ambiguity on the relationship between budgetary participation and outcome criteria, within the framework of the intervening variable model. Role ambiguity was chosen as the intervening variable on the basis of the theoretical arguments linking participation to it, and predicting its effects on both job satisfaction and performance. A recent study by Brownell & McInnes (1986) used a similar framework to explore the potential intervening role of motivation in this relationship; however, their results failed to confirm the hypothesized effect of motivation.

Evidence presented here confirms strong zero-order effects of participation on role ambiguity, and of the latter on both job satisfaction and performance. In combination, these links explain a substantial portion of the zero-order relationships between participation and both job satisfaction and performance. Controlling for the effect of role ambiguity, the direct association between participation and both outcome criteria is insignificant. These results appear to reveal the inadequacies of a simple bivariate approach to exploring the links between participation and outcome criteria.

The paper is organized as follows; in the next section, the concept of role ambiguity is introduced to provide a theoretical basis for the proposed effects of it on job satisfaction and performance, and of budgetary participation on the former. This is followed by a brief section stating the hypotheses of the study. Then follow sections describing the research method, results, limitations and conclusions of the study.

#### *Role ambiguity and outcome criteria*

Role ambiguity occurs where the sent role ex-

pectations for an individual lack sufficient clarity in terms of the required behaviours or expected performance levels. Van Sell *et al.* (1981, p. 66) conclude, for example, that it "... appears to cause lower productivity, tension, dissatisfaction, and psychological withdrawal from the work group". In particular, the negative association between role ambiguity and job satisfaction has considerable support (Beehr *et al.*, 1976; Caplan *et al.*, 1975; Greene, 1972; Hamner & Tosi, 1974; Johnson & Stinson, 1975; Paul, 1974; Rizzo *et al.*, 1970).

Evidence suggesting that decreased role ambiguity leads to improved performance has also been identified. The fundamental argument is that individuals who do not fully understand their duties and responsibilities, or how they are to be evaluated, will hesitate to make decisions and will rely on learning by trial and error. The erratic behaviours which result from this predicament may translate into diminished performance (Hamner & Tosi, 1974).

Results confirming this argument include Brief & Aldag (1976), who isolated negative effects of role ambiguity on measures of performance for nurse's aides; they found a negative association with supervisory evaluations of performance, but not with self-perceptions of work quality. Similarly, Beehr *et al.* (1976) found that role ambiguity was negatively related to effort towards quality, but not towards quantity, while Cohen (1959) found that ambiguity caused lowered productivity. Thus, there appears to be considerable evidence that increased role ambiguity may result in a decline in job satisfaction and performance.

#### *Budgetary participation and role ambiguity*

Role ambiguity can be viewed as the extent to which clear information is lacking regarding (a) the expectations associated with a role, (b) methods for fulfilling role expectations, and/or (c) the consequences of role performance (Graen, 1976). It is argued that participation in the budget-setting process has the potential to clarify information in all three areas.

With regard to clarification of expectations associated with a role, the mere use of goals or

budgets, whether participatively set or not, should contribute to such clarification. However, participation by the focal manager in the budget determination process may further clarify expectations by providing the manager with the opportunity to appreciate those dimensions of role expectations which will, and will not, be quantified financially for budgeting purposes. The importance of this opportunity stems from the fact that some dimensions of the task, about which expectations are being developed, may not readily submit to financial quantification (Hirst, 1981).

As to clarification of methods to be employed in fulfilling role expectations, participation provides the opportunity for the focal manager to bring local, specialised knowledge of his/her task to the budget-setting process, permitting open discussion of preferred means-end approaches. For example, alternative mixes of inputs to production (labour vs capital) or marketing (price vs promotion) may be available to achieve a given expectation or target. Participation in the budgeting process allows due consideration to be given to these alternatives, resolving for the focal manager ambiguity regarding *how* role expectations are to be met.

Finally, in connection with ambiguity regarding the consequences of role performance, participation affords the focal manager the means of clarifying the basis of his or her subsequent evaluation. That is, the participative process can extend beyond the planning phase and include consideration of approaches to be taken in performance evaluation.

Evidence supporting the link between participation and role ambiguity, though not available in the accounting literature, can be found in other literatures. For example, Tosi & Tosi (1970) report that a lack of participation in job-related decisions was associated with role ambiguity for teachers, while Schuler (1980) found support for a negative association between participation in decision-making and role ambiguity, in both manufacturing and public utility organizations.

Together, the theoretical argument and supporting evidence form the basis of an expecta-

tion that participation will be negatively related to role ambiguity.

## HYPOTHESES

It has been argued that an understanding of budgetary participation's effects on job satisfaction and performance is assisted by considering the intervening effect that role ambiguity serves in these relationships. To establish the relevance of role ambiguity as a linking variable, it was argued that a significant part of the participation/outcome criteria associations is indirect, operating initially via the effect of participation in reducing role ambiguity, and then by decreased role ambiguity improving outcomes. These arguments suggest the following hypotheses:

*Hypothesis 1.* The simple relationship between budgetary participation and job satisfaction will be explained by an indirect effect whereby participation reduces role ambiguity, this in turn enhancing job satisfaction.

*Hypothesis 2.* The simple relationship between budgetary participation and subordinate performance will be explained by an indirect effect whereby participation reduces role ambiguity, this in turn enhancing subordinate performance.

## METHOD

Data for this study were collected by a survey questionnaire administered to a sample of 36 middle-level managers drawn from a large manufacturing company. Initial contact was made with managers during an in-house executive development program. These managers were drawn from different divisions within the organization, thereby adding some assurance that the sample was representative of a variety of managerial backgrounds and environmental characteristics.

All managers had responsibility over both revenue generating and cost incurring activities, and all were controlled by a corporate budgeting system. The average age of the respondents was 43 years, with an average length of employ-

ment by the company of 12 years and, in their current position, six years.

### MEASURES

The questionnaire elicited data to measure four variables: role ambiguity, participation, job satisfaction and performance. Role ambiguity was measured using six items from the role pressure instrument developed by Rizzo *et al.* (1970). While this measure has not been without its critics (Tracy & Johnson, 1981), a psychometric evaluation of the instrument by Schuler *et al.* (1977) concluded that its continued use appeared warranted. The instrument has been tested widely in prior research and found to have high levels of validity and reliability. An alpha coefficient (Cronbach, 1951) of 0.87 was observed in this study.

Participation was measured using Milani's (1975) scale. This measure has been used widely in studies of budgetary participation (e.g. Brownell, 1982, 1985; Chenhall, 1986) and has been found to have acceptable validity and reliability. The internal reliability of the scale was 0.71 using Cronbach's alpha.

Job satisfaction was measured using the 20 item, short version of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss *et al.*, 1967). This scale has been shown to possess high levels of discriminant validity (Dunham *et al.*, 1977), and has been used in other research studying the effects of budgetary participation (Brownell, 1982; Chenhall, 1986).

Performance was measured using a self-rating instrument, which asked managers to evaluate their overall performance on a seven-point scale ranging from "performance is barely satisfac-

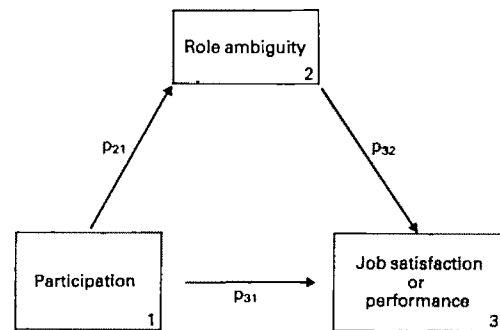
tory" (1) to "performance is extremely good" (7). Self-ratings were utilized in order to preserve anonymity which could not be guaranteed with superior-ratings. While self-ratings have been suggested to exhibit a leniency bias, the evidence on the extent of this is equivocal (Nealey & Owen, 1970). Moreover, any such bias would need to be systematic, as opposed to random, before concern was warranted.

Descriptive statistics of the studied variables are provided in Table 1.

### RESULTS

Of the 36 questionnaires distributed all were returned, but three were unusable due to improper completion of one of the measures; thus the final sample for testing was 33.

To test the hypothesis that role ambiguity was an intervening variable between participation and outcome criteria, path analysis was used. The path model is presented in Fig. 1. In this model the paths ( $p_{ij}$ ) can be used to decompose



$p_{21}$  is the path coefficient linking role ambiguity and participation  
 $p_{31}$  is the path coefficient linking the criteria and participation  
 $p_{32}$  is the path coefficient linking the criteria and role ambiguity

Fig. 1. Path model.

TABLE 1. Descriptive statistics on measures used

|                  | Mean  | Standard deviation | Range   |         |             |         |
|------------------|-------|--------------------|---------|---------|-------------|---------|
|                  |       |                    | Actual  |         | Theoretical |         |
|                  |       |                    | Minimum | Maximum | Minimum     | Maximum |
| Participation    | 31.09 | 5.11               | 21      | 42      | 6           | 42      |
| Role ambiguity   | 15.58 | 4.14               | 8       | 24      | 6           | 30      |
| Performance      | 5.06  | 0.83               | 2       | 6       | 1           | 7       |
| Job satisfaction | 77.36 | 9.73               | 57      | 91      | 20          | 100     |

the correlation coefficients between participation and outcome criteria. Table 2 demonstrates how the observed correlations are decomposed into direct and indirect effects.

The paths were calculated using separate regression analyses for job satisfaction and performance (Asher, 1983). The path  $p_{21}$  is the zero-order correlation  $r_{12}$  (between participation and role ambiguity) as it is posited that participation is the only antecedent of role ambiguity. The paths  $p_{31}$  and  $p_{32}$  for each of performance and job satisfaction were specified by the standardized beta coefficient found by regressing the relevant criterion variable on participation and role ambiguity. The independence of the two regressions was checked by examining the correlation between job satisfaction and performance. This coefficient was 0.22 which is insignificant.

#### *Participation and job satisfaction*

Zero-order correlations between the studied variables are presented in Table 3. The simple correlation between participation and job satisfaction is positive, and significant ( $p < 0.01$ ).

The other two relationships are also significant. First, as hypothesized, a significant, negative relationship exists between participation and role ambiguity. Within the structure of the

path model fitted to the data in this study, the zero-order correlation is the path coefficient,  $p_{21}$ , linking participation and role ambiguity. In terms of parsimony the result is pleasing; over 38% of the variance in role ambiguity is accounted for by participation and, while this is a far cry from a complete explanation, it is doubtful that any other single cause could account for a larger proportion of the variance.

Second, the zero-order correlation between role ambiguity and job satisfaction is negative, and significant, as predicted. However, interpretation of the coefficient,  $-0.490$ , within the path analysis, must await the derivation of the path  $p_{32}$  (between job satisfaction and role ambiguity), since some component of the zero-order correlation may represent a spurious effect resulting from the common antecedent of both variables, namely participation.

Table 4 presents the results of the standardized regression used to generate these coefficients. In contrast to the zero-order correlation, the coefficient for the path linking participation and job satisfaction ( $p_{31}$ ), while positive, is not significant. The results thus reveal the dangers of attempting to shed light on the participation/job satisfaction relationship with the use of simple, bivariate models. Again in contrast to the zero-order correlation, the coefficient  $p_{32}$  (linking job

TABLE 2. Decomposition of observed correlations

| Combination of variables     | Observed correlation | = | Direct effect | + | Indirect effect | + | Spurious effect |
|------------------------------|----------------------|---|---------------|---|-----------------|---|-----------------|
| Participation/role ambiguity | $r_{12}$             |   | $p_{21}$      |   |                 |   |                 |
| Participation/criterion*     | $r_{13}$             |   | $p_{31}$      |   | $p_{32}r_{12}$  |   |                 |
| Role ambiguity/criterion*    | $r_{23}$             |   | $p_{32}$      |   |                 |   | $p_{31}r_{12}$  |

\* The criterion in  $H_1$  is job satisfaction, and in  $H_2$ , performance.

TABLE 3. Zero order correlations among variables

|                                 | Zero order effect |            |
|---------------------------------|-------------------|------------|
| Participation/job satisfaction  | $r = 0.448$       | $p < 0.01$ |
| Participation/performance       | $r = 0.250$       | $p < 0.10$ |
| Participation/role ambiguity    | $r = -0.618$      | $p < 0.01$ |
| Role ambiguity/performance      | $r = -0.513$      | $p < 0.01$ |
| Role ambiguity/job satisfaction | $r = -0.490$      | $p < 0.01$ |

TABLE 4. Derivation of path coefficients  $p_{31}$  and  $p_{32}$  — job satisfaction

| Coefficient | Value         | Standard error    | <i>t</i>   | <i>p</i> |
|-------------|---------------|-------------------|------------|----------|
| $p_{31}$    | 0.2349        | 0.1978            | 1.19       | n.s.     |
| $p_{32}$    | -0.3452       | 0.1980            | -1.74      | n.s.     |
|             | $R^2 = 0.274$ | $F_{2,30} = 5.67$ | $p < 0.01$ |          |

$p_{31}$  is the path coefficient linking job satisfaction and participation.

$p_{32}$  is the path coefficient linking job satisfaction and role ambiguity.

satisfaction and role ambiguity) is negative and insignificant. This result supports the view that some component of the zero-order relationship between role ambiguity and job satisfaction is spurious. Finally, the regression used to generate the path coefficient estimates is significant overall.

The major hypotheses of the study are testable by examination of the decomposition of the zero-order correlation between participation and job satisfaction, presented on the second line of Table 5. A significant zero-order effect ( $r = 0.448$ ) comprises a relatively small, insignificant direct component ( $p_{31} = 0.235$ ), supplemented by a positive indirect effect ( $p_{32} r_{12} = 0.213$ ). This result provides strong support for Hypothesis 1 of the study. A large part of the observed association between participation and job satisfaction is explained by the intervening, indirect effect of role ambiguity. The importance of role ambiguity in an explanation of participation's effect is established simply by considering that a *significant* zero-order relationship between participation and job satisfaction actually involves an *insignificant* direct effect

supplemented by a substantial indirect effect. Therefore, it is only via a simultaneous assessment of participation's effect on role ambiguity, *and* of the latter's effect on job satisfaction, that we gain insight into participation's precise effects.

Line 3 of Table 5 presents the decomposition of the role ambiguity/job satisfaction link. Role ambiguity directly reduces job satisfaction ( $p_{32}$ ), but its overall effect on job satisfaction ( $r_{23}$ ) includes a spurious component since participation serves to reduce role ambiguity ( $p_{21}$ ) as well as to increase job satisfaction ( $p_{31}$ ).

#### Participation and performance

The results presented in Table 3 show that the zero-order correlation between participation and performance ( $r_{13}$ ) is positive, but only marginally significant. Once again evidence concerning the zero-order effect among these variables has been equivocal and inconclusive. The correlation between role ambiguity and performance is negative and significant.

Table 6 presents the results of the standardized regression used to generate paths  $p_{31}$  (be-

TABLE 5. Decomposition of effects in model — job satisfaction

| Linkage                         | Direct effect ( $p_y$ ) | Indirect*/spurious† effects | Total effect ( $r_y$ ) |
|---------------------------------|-------------------------|-----------------------------|------------------------|
| Participation/role ambiguity    | -0.618                  | —                           | -0.618                 |
| Participation/job satisfaction  | 0.2349                  | 0.2131*                     | 0.448                  |
| Role ambiguity/job satisfaction | -0.3452                 | -0.1448†                    | -0.490                 |

TABLE 6. Derivation of path coefficients  $p_{31}$  and  $p_{32}$  — performance

| Coefficient | Value         | Standard error    | <i>t</i>   | <i>p</i> |
|-------------|---------------|-------------------|------------|----------|
| $p_{31}$    | -0.1086       | 0.1983            | -0.55      | n.s.     |
| $p_{32}$    | -0.5801       | 0.1985            | -2.92      | < 0.01   |
|             | $R^2 = 0.270$ | $F_{2,30} = 5.56$ | $p < 0.01$ |          |

$p_{31}$  is the path coefficient linking performance and participation.

$p_{32}$  is the path coefficient linking performance and role ambiguity.

tween performance and participation) and  $p_{32}$  (between performance and role ambiguity). In contrast to the correlation  $r_{13}$ , the path  $p_{31}$  is negative (although not significant). Like the zero-order correlation between role ambiguity and performance,  $r_{23}$ , the coefficient  $p_{32}$  is highly significant and its sign is also negative, as predicted. This supports the view that only some small component of the zero order relationship between role ambiguity and performance is spurious. Overall the regression is highly significant.

Table 7 provides the decomposition of the association between participation and performance. The zero-order effect ( $r = 0.250$ ) actually decomposes into a *negative* direct component (as noted previously) and a more than offsetting *positive* indirect effect. The direct effect of participation on performance is not only insignificant, as many prior researchers have found, but is tending to be negative. This result supports Hypothesis 2. As with job satisfaction, it is through examining the effect of participation on role ambiguity that we gain insight into how participation affects performance.

## CONCLUSIONS

This study sought to improve our understanding of the process by which budget participation influences job satisfaction and performance. The results suggest that role ambiguity is an important link in this process. In particular, the results provide evidence that participation is significantly related to job satisfaction, but not with performance. The relationship with job satisfaction is consistent with many other accounting studies and the findings related to performance conform with those of Brownell (1981), Morse & Reimer (1956) and Kenis (1979). Of more interest was the finding that role ambiguity is an important intervening variable in the relationship between participation and both job satisfaction and performance.

The results are consistent with a view that budgetary participation is most helpful in decreasing managers' role ambiguity and that decreased role ambiguity improves job satisfaction and performance. In the case of job satisfaction, the significant association with participation was due largely to the indirect effect, via

TABLE 7. Decomposition of effects in model — performance

| Linkage                      | Direct effect ( $p_{ij}$ ) | Indirect*/spurious† effects | Total effect ( $r_{ij}$ ) |
|------------------------------|----------------------------|-----------------------------|---------------------------|
| Participation/role ambiguity | -0.618                     | —                           | -0.618                    |
| Participation/performance    | -0.1086                    | 0.3586*                     | 0.250                     |
| Role ambiguity/performance   | -0.5801                    | 0.0671†                     | -0.513                    |

Finally, Table 7 presents the decomposition of the role ambiguity/performance link. The positively signed spurious effect indicates that, but for participation's mildly negative effect on performance ( $p_{31} = -0.1086$ ), reductions in role ambiguity would provide even greater performance-enhancing effects. Put alternatively, if role ambiguity could be reduced by means other than increasing participation, even more notable effects on performance would emerge. This of course presumes that these other means, themselves, have no direct negative effect on performance, or at least have effects more positive than we find here for participation.

role ambiguity. This was sufficiently strong to leave a relatively small direct effect to be explained by other influences. With regard to performance, the path coefficient ( $p_{31}$ ) linking it to participation was actually negative, whereas the corresponding correlation coefficient ( $r_{13}$ ) was positive. While this finding that role ambiguity is an important intervening variable is pleasing, the fact that this was not translated into an unequivocal positive association between participation and performance is disappointing for advocates of participative budgeting. Clearly, it would be of interest to identify why the relationship between participation and perform-



ance changed from positive to negative after adjusting for the indirect path through role ambiguity.

The intervening variable model utilized here has the potential to offer added insight to models using the contingency framework described earlier. It should be noted that the two models have the combined potential to explain a wide range of anomalies in past research, and that each should be clearly viewed as a complement of the other. Future research should pay careful attention to the question of which of the theoretical views has a comparative advantage in the context of the particular issues and settings examined. Indeed, researchers might well benefit from treating the issue of which model is better suited as a strictly empirical question, designing their studies to accommodate both views.

This study is subject to several limitations which may be identified. First, the results of path analysis do not constitute proof of the causal direction of effects. The results must be interpreted within the confines of the theoretical position developed in the paper. This important point is often overlooked, especially because

many applications of path analytic techniques have attracted the entirely inappropriate label of "causal analysis". The ability to infer causation is a function of the research design leading to the data, not the manner in which the data are statistically analyzed. Second, while established instruments for role ambiguity, budgetary participation and job satisfaction were used, the performance measurement was relatively crude. Additional measures which are externally verifiable may have enhanced the measurement of performance. Third, the study was completed within a single organization thus limiting the generalizability of the findings. Finally, the research focussed on a single intervening variable, and it is possible, indeed likely, that other variables can add to the explanation of the indirect path between participation and criteria.

Notwithstanding these limitations, the results of the study indicate that an improved understanding of the effects of budgetary participation can be gained by examining the role of variables which intervene in the link between participation and organizational criteria.

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## OCCUPATIONAL REALITY SHOCK AND ORGANIZATIONAL COMMITMENT: EVIDENCE FROM THE ACCOUNTING PROFESSION

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### Abstract

A longitudinal field survey was undertaken to investigate the effects of occupational reality shock on the organizational commitment attitudes, intentions, and behavior of professional accountants. Comparative data was collected over a one year period from a sample of accountants employed in the controller's division of a large (Fortune 100) industrial firm and from a sample of accountants employed by a "Big Eight" public accounting firm. The results portray reality shock as having a significant, asymmetrical impact on the work-related attitudes, intentions, and to a lesser extent behavior of accountants employed in both organizational settings.

Occupational reality shock (ORS) refers to the discrepancy between an individual's work expectations established *prior* to joining an organization and the individual's perceptions *after* becoming a member of that organization. In the case of professional accountants, ORS may result from unmet expectations with respect to professional norms and values, the specific organizational setting (i.e. the job context), and the specific job content. The notion of expectation-perception discrepancy was first introduced in the accounting literature by Lawler *et al.* (1975), who observed that professional accountants may experience job choice dissonance when work expectations are not met.

More recently, there has been a growing interest in the effects of ORS on the work-related attitudes and behavior of employees (Dean, 1983; Greenhaus *et al.*, 1983; Hoiberg & Berry, 1978; Horner, 1979; Ilgen & Dugoni, 1977). Dean & Wanous (1983), for example, found that ORS had a significant impact on the organiza-

tional commitment and turnover intentions of bank tellers. Similarly, Sorensen & Sorensen (1972, 1974) observed that unmet expectations with respect to professional norms and values may be related to accountants' turnover intentions and job dissatisfaction. And, Schneider (1975) observed that ORS had an impact on the performance of insurance salesmen. Hence, these results suggest that if organizations can effectively manage the impact of ORS on their employees, they may increase their ability to retain desired employees and induce higher levels of performance from them.

Since personnel retention and performance attainment are frequently mentioned concerns by partners and managers of accounting organizations, the purpose of this study was to investigate the impact of ORS on the attitudes, intentions and behavior of professional accountants. Comparative data were collected over a one year period from a sample of accountants employed in the controller's division of a large

(Fortune 100) industrial firm and a sample of accountants employed by a "Big Eight" public accounting firm. The data were analyzed to determine the presence and magnitude of ORS among professional accountants in differing organizational settings, and to assess the impact on the individual's organizational commitment attitudes, intentions and behavior. The results of the study portray ORS as having a significant impact on the work-related attitudes, intentions and behavior of accountants employed in both organizational settings.

### THEORETICAL BACKGROUND

Traditionally, organizational socialization has been viewed from two different perspectives. From the organization's perspective, it is a process of induction, basic training and indoctrination of the individual to the major norms and values of the organization, and of testing new employees in order to place them in an appropriate job and career path (Schein, 1968). From the individual's point of view, socialization is a process of breaking-in and joining up, of "learning the ropes," of figuring out how to get along and how to make it (Van Maanen, 1975). Schein (1978) describes these two processes as leading to a psychological contract — a matching of what the individual will give with what the organization expects to receive and what the organization will give relative to what the individual expects to receive. This paper is concerned primarily with the individual's expectations — what the new employee expects to receive from the organization relative to what this individual expects to be required to contribute.

Dean (1983) argues that, for the individual, the socialization process may commence long before the individual actually joins an organization. Researchers have identified four major sources of pre-entry expectations:

**Societal stereotyping.** Van Maanen (1976) observed, for example, the considerable supply of young males desiring to pursue police work at a profession. He argued that a cultural stereotype

existed with respect to police work (i.e. high adventure, contribution to society, masculine, romantic), which is shared by virtually all who join a police force.

**Childhood experiences.** Dean (1981) notes that one of the primary contributors to individual expectations formation is early childhood experience. A child visiting a bank, for example, may attach unrealistic status to the role of the bank teller who cashes a parent's welfare check, in that the teller appears to exercise control over a valued resource (i.e. money).

**Professional orientation.** Fox (1957) and Miller & Wager (1971) describe the role played by graduate and professional schools in transmitting the values, attitudes, skills and knowledge of a professional subculture to students. Similarly, Levinson (1967) observed that the death and autopsy of patients was an early, significant developmental experience for medical students with respect to finding a balance of detachment and concern in their relationship with patients.

**Organizational entry.** Gomersall & Myers (1966), Wanous (1976, 1980), and Dean & Wanous (1984) studied the role of the organization's recruitment, selection and orientation process in influencing the expectations of job candidates and newly hired employees. They found that employees who were given realistic information prior to joining the organization reported more accurate expectations, and subsequently experienced higher job satisfaction and less turnover.

There is an emerging body of research which indicates that the more successful and complete the socialization process is, the greater will be an organization's ability to retain desired employees and stimulate their performance (Dean, 1981, 1983; Dean & Wanous, 1983, 1984; Horner, 1979; Wanous, 1976; Youngberg, 1963). When the socialization process is either not complete or not successful, a discrepancy may exist between an individual's premembership expectations and the individual's perceptions formed after becoming a member of the organization; this discrepancy has been called "reality shock" (Hughes, 1959; Rand, 1981; Wish, 1977).

### *Occupational reality shock*

The historical roots of the construct of ORS may be traced to the work of March & Simon (1958). They observed that an individual in an organization is essentially faced with two different decisions: the decision to participate and the decision to produce. These decisions are presumably based on the balance of payments to members for their continued participation and contribution to the organization. Accordingly, an individual will continue to participate and produce so long as the inducements or outcomes received are perceived to be greater than that which the individual contributes to the organization. Prior to joining the organization, a new employee has established expectations regarding contribution and inducements. When these expectations differ significantly from reality, this discrepancy may impact the employee's decision to participate or produce.

The construct of reality shock was further developed by Porter & Steers (1973), whose work led to the formulation of the "met expectations hypothesis," a rather general notion that the degree of expectation fulfillment is an important predictor of employee job attitudes and behavior. Specifically, they hypothesized that a new employee's decision to remain in an organi-

zation was a function of how well the individual's desired expectations were met by either actual or potential rewards.

More recently, Dean (1983) integrated the organizational commitment and organizational entry literatures to formulate a model of the antecedents and outcomes of ORS (see Fig. 1). This model links pre-entry expectations, post-entry experiences, reality shock and organizational commitment; the socialization process is recognized as the major cause of ORS, and commitment attitudes, intentions and behavior as the primary outcomes. A fundamental hypothesis of the model is that ORS has a negative impact on the degree to which an individual is committed to an employing organization.

### *Organizational commitment*

Organizational commitment refers to the relative strength of an individual's identification with and involvement in a particular organization (Steers, 1977). It has frequently been characterized by at least three factors: (1) a strong belief in and acceptance of the organization's goals and values; (2) a willingness to exert considerable effort on behalf of the organization; and (3) a strong desire to maintain membership in the organization (Mowday *et al.*, 1979). When

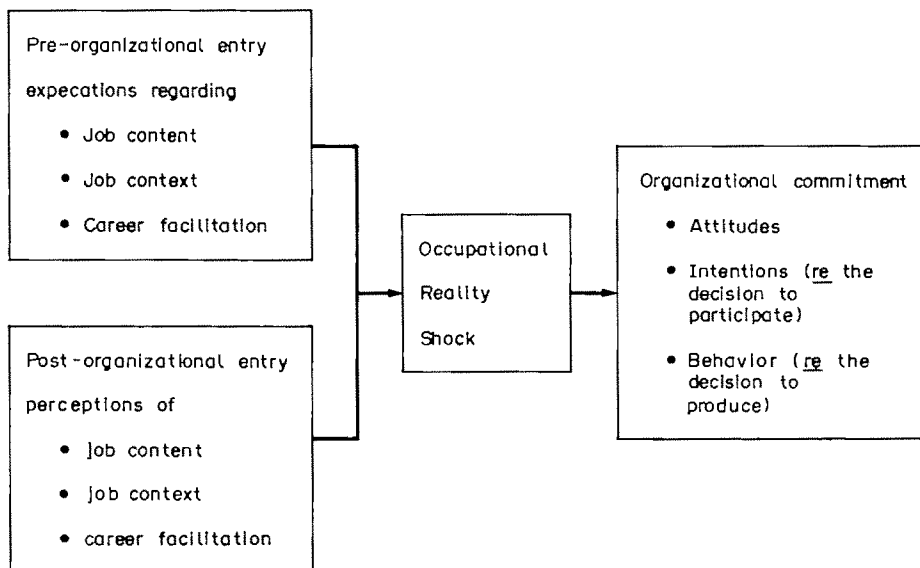


Fig. 1. Antecedents and outcomes of ORS (adapted from Dean, 1983).

defined in this fashion, commitment represents something beyond mere passive loyalty to an organization; it involves an active relationship with the organization based not only in individual attitudes and beliefs, but in behavioral intentions and actual behavior as well.

Salancik (1977) argues that, although attitudes may serve as indicators of commitment, actual behavior may be a stronger indication. He argues that the degree of an individual's commitment is derived from the extent to which behaviors are binding. Four characteristics of behavioral acts make them binding, and hence determine the degree of personal commitment: explicitness, revocability, volition, and publicity (Salancik, 1977).

The construct of commitment may also be linked to March & Simon's (1958) notion of contributions and inducements. Individuals will be organizationally committed to participate and produce so long as their perceptions of the inducements received exceeds the contributions made. An individual who is morally committed to an organization may, in some situations, continue to participate and produce even when a negative balance of contributions is perceived; in general, however, when individual expectations regarding inducements and contributions differ significantly from reality (i.e. expectations are not met), the relative strength of an individual's organizational commitment can be expected to diminish. Thus, ORS may be a significant antecedent of commitment attitudes, intentions and behavior.

### *Hypotheses*

There is substantial evidence suggesting that individuals entering a career in accountancy suffer from ORS (Sorensen *et al.*, 1973). Sorensen & Sorensen (1972, 1974) and Aranya & Ferris (1984), for example, obtained results linking unmet professional expectations with the job

satisfaction and turnover attitudes of professional accountants. There is little evidence, however, which links expectancy discrepancies with regard to specific aspects of the job and the organization with the subsequent organizational commitment of professional accountants. Hence, the purpose of this study was to test two hypotheses:

*Hypothesis 1.* Recent graduates entering accounting organizations have expectations that are not confirmed by their work experience.

*Hypothesis 2.* An accountant's commitment to an organization, as determined by measuring the individual's attitudes, intentions, and behavior, is inversely related to the extent of reality shock experienced.

## METHOD

### *Research site and subjects*

To investigate the above hypotheses, a longitudinal field survey was undertaken. Questionnaires were distributed to all new employees<sup>1</sup> in two organizational settings: the controller's division of a large "Fortune 100" industrial firm ( $n = 53$ ) and one office of a large "Big Eight" public accounting firm ( $n = 162$ ). Both organizations were located in the same metropolitan area and recruited their employees primarily from the same set of college campuses.

Two questionnaires were distributed — one at the beginning of their first day of employment and a second one after one year's employment. The purpose of the first questionnaire was to assess pre-employment expectations, whereas the second questionnaire was designed to measure the perceptions developed after one year of work experience. Questionnaires were administered under the direction of the researchers and respondents were guaranteed anonymity. Complete data sets were obtained for 94 ( $n = 50$ ) and 75% ( $n = 122$ ) respectively, of the employee groups; an overall response rate of 80% ( $n = 172$ ) was obtained.<sup>2</sup>

<sup>1</sup>Our sampling of "new employees" was restricted to those individuals having an accounting major (i.e. 21 credit hours or more in accounting area courses) in either a graduate or undergraduate degree and/or those individuals hired into the audit division of the public accounting firm.

<sup>2</sup>These response rates exceed the higher end of the modal range of 20–40% normally expected for mailed questionnaires (Kerlinger, 1973); a response rate of 40–50% is generally considered adequate for the analysis and reporting of survey data (Babbie, 1979).

### Measures

**Job content and context.** Pre- and post-membership perceptions regarding job content and context were measured using the Job Diagnostic Survey (JDS) (Hackman & Oldham, 1975). The JDS provides measures of (a) five core job dimensions (skill variety, task identity, task significance, autonomy and feedback from the job itself), (b) two supplementary job dimensions (feedback from others, dealing with others), and (c) seven affective responses to the job (overall job satisfaction; satisfaction with job security, pay, co-workers, supervision, satisfaction with the opportunity for personal growth and development, and internal work motivation). In addition to the above, the JDS provides a sum-

mary measure reflecting the overall motivating potential of a job as a function of the five core job dimensions.<sup>3</sup> The five core job dimensions, two supplementary job dimensions and overall motivating potential score are generally considered to be indicators of *job content*, whereas *job context* is assessed by the seven affective responses.

The JDS is a widely utilized instrument for diagnosing existing jobs and evaluating the effects of work experience over time. The instrument has been found to have good psychometric characteristics, and the scale reliability statistics observed in the current study (see Table 1) accord well with those observed in prior research (Hackman & Oldham, 1975).

TABLE 1. Scale reliability statistics\*

| Scale                           | Internal consistency coefficient |       |                         |
|---------------------------------|----------------------------------|-------|-------------------------|
|                                 | $T_1$                            | $T_2$ | Hackman & Oldham (1975) |
| Job diagnostic survey:          |                                  |       |                         |
| <i>Job content</i>              |                                  |       |                         |
| Core job dimensions             |                                  |       |                         |
| Skill variety                   | 0.51                             | 0.69  | 0.71                    |
| Task identity                   | 0.60                             | 0.73  | 0.59                    |
| Task significance               | 0.61                             | 0.74  | 0.66                    |
| Autonomy                        | 0.58                             | 0.74  | 0.66                    |
| Feedback from job               | 0.66                             | 0.82  | 0.71                    |
| Supplementary job dimensions    |                                  |       |                         |
| Feedback from others            | 0.63                             | 0.85  | 0.78                    |
| Dealing with others             | 0.37                             | 0.68  | 0.59                    |
| Overall motivating potential    | 0.79                             | 0.85  | —                       |
| <i>Job context</i>              |                                  |       |                         |
| Affective responses             |                                  |       |                         |
| Overall job satisfaction        | 0.71                             | 0.82  | 0.76                    |
| Satisfaction with:              |                                  |       |                         |
| Job security                    | 0.71                             | 0.90  | —                       |
| Pay                             | 0.83                             | 0.88  | —                       |
| Co-workers                      | 0.51                             | 0.54  | 0.56                    |
| Supervision                     | 0.77                             | 0.83  | 0.79                    |
| Personal growth                 | 0.73                             | 0.81  | 0.84                    |
| Internal work motivation        | 0.47                             | 0.64  | 0.76                    |
| Career facilitation             | 0.56                             | 0.77  |                         |
| Organizational commitment (OCQ) | —                                | 0.89  |                         |
| Intent to remain                | —                                | 0.91  |                         |
| Performance index               | —                                | 0.78  |                         |

\*Internal consistency coefficients computed using Cronbach's (1970) alpha.

<sup>3</sup>For further details of the JDS, the interested reader is referred to Hackman & Oldham (1975). See Appendix for variable definitions.

**Career facilitation.** Career expectations refer to those expectations that an individual has about his or her future career; these include (a) expectations regarding promotion, intra-organizational mobility, opportunity for progression up the organization's hierarchy, pay progression, and organizational assistance with career planning, and (b) expectations regarding inter-organizational mobility.

Items were adapted from Schneider & Dachler (1978) to measure the extent to which a respondent believed that the present job and organization would help to achieve his/her career goals. The eight items (see Table 2) were included in both questionnaires. Respondents were instructed to indicate the degree of accuracy of each item, using a verbally-anchored scale. These responses were averaged, after adjusting for negatively scored items, to obtain an index of career facilitation. The reliability of the scale was 0.56 at time 1 and 0.77 at time 2.

TABLE 2. Career facilitation items (adapted from Schneider & Dachler, 1978)

|     |                                                                                                           |
|-----|-----------------------------------------------------------------------------------------------------------|
| (1) | There are opportunities for me to pursue my career interests at (name of firm).                           |
| (2) | (Firm) provides information about how different jobs fit into different career programs.                  |
| (3) | (Firm) provides information and counseling about my career.                                               |
| (4) | (Firm) helps me achieve my personal career goals.                                                         |
| (5) | (Firm) does not take people's career interests into consideration when placing them in various positions. |
| (6) | Supervisory personnel I work for will inhibit my career interests.                                        |
| (7) | (Firm) makes it difficult for me to change into a different career.                                       |
| (8) | (Firm) exposes people to jobs that fit into various career patterns.                                      |

**Reality shock.** ORS was measured by calculating the difference between employee expectations at time period 1 and those reported at time period 2; thus, reality shock is a measure of the change in respondent expectations (as mea-

sured by the JDS and the career facilitation scale) over the one year period. Since time 2 responses were subtracted from time 1 responses, positive ORS values indicate a diminishment of expectations over time; the smaller the value, the less the discrepancy between those expectations. Similarly, negative ORS values indicate that the job experienced was "better" than expected.

**Organizational commitment.** Three measures of organizational commitment were obtained for each subject at time 2, that is after one year's employment. First, a respondent's commitment *attitudes* were measured using the Organizational Commitment Questionnaire (OCQ) developed by Porter *et al.* (1974). The instrument contains 15 items, and respondents are requested to indicate the extent of their agreement with the items on a seven point, verbally-anchored scale. The OCQ emphasizes the employee's moral involvement with an organization, and has been the most widely utilized commitment instrument to date (Ferris & Aranya, 1983). The scale reliability statistic (0.89) observed in the current study (see Table 1) accords well with those obtained in validation studies of the instrument (Mowday *et al.*, 1979).

Second, a subject's commitment *intentions* (i.e. the decision to participate) were measured using Jackofsky's (1982) "intentions to quit" questionnaire. This instrument contains seven items and respondents are requested to indicate the extent of their agreement with the items on a verbally-anchored scale. The responses were averaged to obtain an index of the respondent's intentions to quit; this index was then inversely coded (i.e. intent to remain) for consistency with the other commitment measures. The reliability of the scale was 0.91.

Finally, a subject's actual commitment *behavior* (i.e. the decision to produce) was measured by obtaining an overall performance rating for the prior year.<sup>4</sup> Performance measures

<sup>4</sup>In public accounting, employees are rated by their immediate supervisor after each client engagement of 40 hours or more; thus, depending upon the number and duration of client engagements undertaken, employees could receive a variable number of performance ratings in a given year. At the end of a given year, the individual assignment ratings are accumulated into a single overall performance rating (usually) by the partner-in-charge of personnel.



were obtained from the personnel files of each respective firm, and were standardized to a five point scale of "outstanding" (5) to "unsatisfactory" (1). In addition, the subject's personnel supervisor was requested to evaluate each individual with respect to promotability, rehirable, and replaceability using a five point, verbally-anchored scale. These latter items were aggregated and averaged with the overall performance rating to form a four item index of commitment behavior. The reliability of this index was 0.78.

**Control variables.** Prior research by Ferris (1981) indicates that the organizational commitment of professional accountants is, in part, a function of individual characteristics. Hence, to accurately assess the relationship between ORS and commitment, it was necessary to control for the potential influence of these variables. The

control variables included: age, sex, marital status, social background,<sup>5</sup> educational background (graduate vs undergraduate degree, grade point average, accounting hours taken), and prior work experience.

The results presented in Table 3 indicate that the two samples were demographically similar with the exception of two factors: age and undergraduate grade point average. The public accounting firm sample was found to be significantly ( $p < 0.01$ ) younger and to possess a significantly ( $p < 0.001$ ) higher undergraduate grade point average; however, since the average number of undergraduate accounting hours, and hence presumably the extent of preorganizational socialization was approximately the same for the two samples, these differences were not anticipated to systematically influence the study results.

TABLE 3. Demographic statistics of study respondents

| Personal characteristic             | Total sample<br>( <i>n</i> = 172) | Industrial firm<br>( <i>n</i> = 50) | Public accounting firm<br>( <i>n</i> = 122) | <i>t</i> -value |
|-------------------------------------|-----------------------------------|-------------------------------------|---------------------------------------------|-----------------|
| Age (years)                         | 23.2                              | 24.1                                | 22.8                                        | 2.89†           |
| Sex (percent males)                 | 59.3%                             | 50.0%                               | 63.1%                                       | -1.59           |
| Marital status<br>(percent married) | 24.9%                             | 27.7%                               | 23.8%                                       | 0.52            |
| Social background                   | 2.59                              | 2.80                                | 2.56                                        | 1.56            |
| Prior work experience:              |                                   |                                     |                                             |                 |
| Percent of sample                   | 15.1%                             | 14.0%                               | 15.6%                                       | -0.26           |
| Duration (months)                   | 27.8                              | 21.3                                | 30.2                                        | -0.99           |
| Educational background:             |                                   |                                     |                                             |                 |
| Undergraduate                       |                                   |                                     |                                             |                 |
| Grade point average                 | 3.36                              | 3.20                                | 3.43                                        | -3.98‡          |
| Accounting hours taken (hours)      | 30.85                             | 30.2                                | 31.1                                        | -0.53           |
| Graduate                            |                                   |                                     |                                             |                 |
| Percent with advanced degree        | 24.4%                             | 22.0%                               | 25.4%                                       | -0.47           |
| Grade point average                 | 3.42                              | 3.29                                | 3.47                                        | -1.57           |
| Accounting hours taken (hours)      | 22.37                             | 22.6                                | 22.3                                        | 0.14            |

\* $p \leq 0.05$ .

† $p \leq 0.01$ .

‡ $p \leq 0.001$ .

Similarly, in the industrial firm, subjects could rotate through three or four accounting function areas in the Controller's office. Individual supervisory ratings were obtained after each rotation, and then averaged to a single overall rating by the office personnel manager.

<sup>5</sup>Social background was assessed using a formula developed by Hollingshead & Redlich (1958) which incorporates, among other factors, the level of education and the occupation of the respondent's parents.

### *Data analysis*

Several methods of analysis were utilized to investigate the hypotheses. Traditional *t*-tests were used to examine hypothesis 1, whereas hypothesis 2 was examined using partial correlation analysis. In addition, since our model implies a multivariate causal relationship between work expectations and perceptions and the individual's subsequent organizational commitment, an attempt was made to investigate the relative impact of ORS on the commitment variables. Factor analysis was undertaken to reduce the set of independent variables, followed by regression analysis. It should be noted that this latter analysis cannot conclusively establish the validity of the implied causal links, but merely indicates the relative strength of those relationships if the model is correctly specified.

## RESULTS

### *Inter-firm comparison*

The results in Table 4 indicate that the industrial firm accountants had significantly higher pre-entry expectations on six job dimensions: autonomy, overall job satisfaction, satisfaction with job security, pay, co-workers, and supervision; in addition, the overall motivating potential, a summary measure of the motivational potential of a job, was also significantly greater for the industrial firm sample. On only one item, dealing with others, were the industrial firm accountants found to have significantly lower pre-entry expectations. After one year, the industrial firm sample still had significantly higher perceptions with regard to autonomy, overall job satisfaction, satisfaction with job security, pay, co-workers and supervision, and overall motivating potential, and lower perceptions with regard to skill variety and dealing with others.<sup>6</sup>

These results appear to indicate that individuals entering a career in public accountancy, at least in a large firm setting, do so with signifi-

cantly lower expectations of being satisfied in their work (i.e. the job context) than their counterparts in industrial organizations. This fact also appears reflected in the commitment attitudes of the two samples, which were significantly lower for the public accounting firm sample at time period 2. Whether these lower expectations reflect a more realistic approach to the work environment is addressed by hypothesis 1.

### *Hypothesis 1*

The results presented in Table 4 provide evidence suggesting that regardless of the organizational setting (i.e. industrial vs professional firm setting), new employees entering accounting positions have work expectations that are *not* being confirmed by their actual work experience at least during the first year of employment. In the case of the industrial firm sample, work expectations significantly declined from time period 1 to 2 on nine job dimensions: skill variety, feedback from others, overall job satisfaction, satisfaction with job security, pay, supervision, personal growth, internal work motivation, and career facilitation. With respect to the professional firm sample, similar findings were obtained, but to a greater extent (i.e. greater ORS). With the exception of skill variety, the same set of diminished work expectations were also observed for the professional firm sample; in addition, however, three new dimensions (i.e. task significance, feedback from job, and satisfaction with co-workers) were also found to decline for this sample. In only one instance, task identity for the accounting firm sample, did employee expectations significantly increase over the one year period.

It is of interest to highlight the rather consistent drop-off of expectations involving the affective responses to work and the work setting for *both* organizational groups. Without additional evidence, however, it is difficult to determine whether this phenomenon is attributable to accounting as a work endeavor or is simply charac-

<sup>6</sup>The finding with respect to skill variety and dealing with others appears consistent with the commonly held view that public accounting employment requires the use of a greater number of non-repetitive skills and the opportunity for greater client interaction.

TABLE 4. Mean work expectations, perceptions and reality shock

| Variables                    | Work expectations<br>( $T = 1$ )          |                                            |                                         |                                           | $\phi$                                     | Work perceptions<br>( $T = 2$ )         |                                             |                                              |                                           | Reality shock<br>( $T_1 - T_2$ ) |  |  |
|------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|---------------------------------------------|----------------------------------------------|-------------------------------------------|----------------------------------|--|--|
|                              | Industrial<br>Firm<br>( $n = 50$ )<br>(A) | Accounting<br>Firm<br>( $n = 122$ )<br>(B) | Total<br>Sample<br>( $n = 172$ )<br>(C) | Industrial<br>Firm<br>( $n = 50$ )<br>(D) | Accounting<br>Firm<br>( $n = 122$ )<br>(E) | Total<br>Sample<br>( $n = 172$ )<br>(F) | Industrial<br>Firm<br>( $n = 50$ )<br>(A-D) | Accounting<br>Firm<br>( $n = 122$ )<br>(B-E) | Total<br>Sample<br>( $n = 172$ )<br>(C-F) |                                  |  |  |
| Core job dimensions          |                                           |                                            |                                         |                                           |                                            |                                         |                                             |                                              |                                           |                                  |  |  |
| Skill variety                | 5.09                                      | 5.26                                       | 5.21                                    | 4.57**                                    | 5.11                                       | 4.95                                    | 0.52†                                       | 0.15                                         | 0.26††                                    |                                  |  |  |
| Task identity                | 4.17                                      | 3.89                                       | 3.97                                    | 4.51                                      | 4.41                                       | 4.44                                    | -0.34                                       | -0.52†††                                     | -0.47†††                                  |                                  |  |  |
| Task significance            | 5.18                                      | 5.25                                       | 5.22                                    | 5.04                                      | 4.73                                       | 4.82                                    | 0.14                                        | 0.52†††                                      | 0.40†††                                   |                                  |  |  |
| Autonomy                     | 4.74***                                   | 4.18                                       | 4.35                                    | 5.07***                                   | 4.39                                       | 4.59                                    | -0.33                                       | -0.21                                        | -0.24†                                    |                                  |  |  |
| Feedback from job            | 5.07                                      | 4.87                                       | 4.93                                    | 4.88                                      | 4.56                                       | 4.65                                    | 0.19                                        | 0.31††                                       | 0.28††                                    |                                  |  |  |
| Supplementary job dimensions |                                           |                                            |                                         |                                           |                                            |                                         |                                             |                                              |                                           |                                  |  |  |
| Feedback from others         | 5.85                                      | 5.74                                       | 5.77                                    | 4.63                                      | 4.63                                       | 4.63                                    | 1.22†††                                     | 1.11†††                                      | 1.14†††                                   |                                  |  |  |
| Dealing with others          | 5.97***                                   | 6.34                                       | 6.23                                    | 5.86**                                    | 6.28                                       | 6.16                                    | 0.11                                        | 0.06                                         | 0.07                                      |                                  |  |  |
| Overall motivating potential | 118.83*                                   | 102.40                                     | 107.10                                  | 122.72*                                   | 101.58                                     | 107.93                                  | -3.89                                       | 0.82                                         | -0.83                                     |                                  |  |  |
| Affective responses          |                                           |                                            |                                         |                                           |                                            |                                         |                                             |                                              |                                           |                                  |  |  |
| Overall job satisfaction     | 5.73**                                    | 5.36                                       | 5.47                                    | 5.04***                                   | 4.02                                       | 4.32                                    | 0.69†††                                     | 1.34†††                                      | 1.15†††                                   |                                  |  |  |
| Satisfaction with            |                                           |                                            |                                         |                                           |                                            |                                         |                                             |                                              |                                           |                                  |  |  |
| Job security                 | 5.86**                                    | 5.51                                       | 5.61                                    | 5.11***                                   | 3.29                                       | 3.81                                    | 0.75†††                                     | 2.22†††                                      | 1.80†††                                   |                                  |  |  |
| Pay                          | 6.10**                                    | 5.70                                       | 5.82                                    | 5.79***                                   | 4.59                                       | 4.94                                    | 0.31††                                      | 1.11†††                                      | 0.88†††                                   |                                  |  |  |
| Co-workers                   | 5.93*                                     | 5.71                                       | 5.77                                    | 5.75*                                     | 5.46                                       | 5.55                                    | 0.18                                        | 0.25††                                       | 0.22††                                    |                                  |  |  |
| Supervision                  | 5.80*                                     | 5.50                                       | 5.59                                    | 5.31*                                     | 4.88                                       | 5.00                                    | 0.49††                                      | 0.62†††                                      | 0.59†††                                   |                                  |  |  |
| Personal growth              | 5.73                                      | 5.60                                       | 5.64                                    | 5.16                                      | 4.89                                       | 4.97                                    | 0.57†††                                     | 0.71†††                                      | 0.67†††                                   |                                  |  |  |
| Internal work motivation     | 6.00                                      | 5.99                                       | 6.00                                    | 5.74                                      | 5.83                                       | 5.81                                    | 0.26††                                      | 0.16††                                       | 0.19†††                                   |                                  |  |  |
| Career facilitation          | 5.95                                      | 5.83                                       | 5.87                                    | 4.79                                      | 4.77                                       | 4.79                                    | 1.16†††                                     | 1.06†††                                      | 1.08†††                                   |                                  |  |  |
| Organizational commitment:   |                                           |                                            |                                         |                                           |                                            |                                         |                                             |                                              |                                           |                                  |  |  |
| OCQ score                    | —                                         | —                                          | —                                       | 5.49***                                   | 4.89                                       | 5.07                                    |                                             |                                              |                                           |                                  |  |  |
| Intent to remain             | —                                         | —                                          | —                                       | 5.45**                                    | 4.77                                       | 4.97                                    |                                             |                                              |                                           |                                  |  |  |
| Performance index            | —                                         | —                                          | —                                       | 3.43***                                   | 3.81                                       | 3.70                                    |                                             |                                              |                                           |                                  |  |  |

Significant *interfirm* differences, at  $T_1$  or  $T_2$ , are designated by asterisks; significant *intrafirm* differences, between  $T_1$  and  $T_2$ , are designated by daggers; and significant *total sample* differences, between  $T_1$  and  $T_2$ , are designated by double daggers as follows:

Interfirm      Intrafirm      Total sample

\*                    †                    ‡

\*\*                  ††                  ††

\*\*\*               †††               †††

‡                    †                    ‡

‡‡                  ††                  ‡‡

‡‡‡               †††               ‡‡‡

$p < 0.05$ .

$p < 0.01$ .

$p < 0.001$ .

teristic of these particular work settings. It is also of interest to note that the decline in affective responses is significantly different between the two samples on three factors: overall job satisfaction ( $p \leq 0.01$ ) and satisfaction with job security ( $p < 0.001$ ) and pay ( $p < 0.001$ ). The ORS measures in Table 4 indicate that reality shock was significantly greater for the accounting firm employees on each of the three factors, and that these subjects experienced significantly greater unmet expectations over the one year period. This finding may be significant in explaining the somewhat high turnover rate that has characterized professional accounting firms relative to their industrial counterparts.

### *Hypothesis 2*

The results in Table 5 suggest that the extent of reality shock experienced *does* impact the employee's organizational commitment attitudes, intentions and behavior (as measured at time period 2). As predicted, the correlation between the study variables and the three organizational commitment measures were negative, and in many cases significant. ORS was primarily observed to be related to the employees' commitment attitudes and their commitment intentions. Significant correlations between the study variables and commitment, when defined in terms of actual behavior, were observed in only seven cases, and then primarily (i.e. in five cases) for the public accounting firm sample. Hence, the findings appear to indicate that while ORS may be a significant precursor of employee performance on some job dimensions, it does not appear to be so on all job dimensions. This finding may be explained, in part, by the need to achieve acceptable levels of performance for job mobility purposes, in spite of the presence of ORS (Gillespie *et al.*, 1976). Another possible explanation concerns rater consistency and rating specification problems — performance evaluation concerns identified in prior CPA firm research (e.g. see Jiambalvo, 1982; Ferris & Larcher, 1983).

To investigate for the possibility of a differential relationship between commitment and negative vs positive ORS scores, correlations were re-computed after partitioning the ORS measures. In *only* two instances were significant correlations observed between negative (i.e. experiences were *better* than expected) ORS scores and the three commitment measures, and in nearly every case, the correlation coefficient between commitment and positive ORS scores not only remained significant, but also increased in magnitude. These results appear to indicate the presence of an asymmetrical relationship: when an employee's expectations are unmet, commitment can be expected to diminish; however, where expectations are surpassed, no increment in commitment attitudes, intentions or behavior should be expected.

Thus, contrary to traditional thought, ORS may be a "one-way street." Failure to satisfy employee expectations may result in dysfunctional organizational outcomes; and, while the level of organizationally-expected commitment can be attained by satisfying employee expectations, it may not be possible to extract higher than expected commitment levels by surpassing those expectations.

### *Multivariate analysis*

Figure 1 implies a multivariate causal relationship between ORS and organizational commitment. To investigate these causal links, a factor analysis (involving principal components analysis, with varimax rotation and Kaiser normalization) of the job content and context variables was undertaken in an effort to reduce the set of independent variables. Factors loadings exceeding 0.5 are highlighted in Table 6 and were used to identify the resulting factors.

Three factors were identified using time period 1 data; factors 1 and 3 reflect job content, whereas factor 2 reflects job context.<sup>7</sup> For purposes of subsequent data analysis, the overall motivating potential score was selected to represent factor 1, overall job satisfaction to repre-

<sup>7</sup>A factor analysis of the data at time period 2 produced three similar factors, in addition to a fourth factor representing both job content and context, which was ignored for subsequent analyses.

TABLE 5. Significant partial correlations of reality shock with organizational commitment measures

| Job dimension                       | Organizational commitment |                 |              |                  |                 |              |                   |                 |              |              |
|-------------------------------------|---------------------------|-----------------|--------------|------------------|-----------------|--------------|-------------------|-----------------|--------------|--------------|
|                                     | OCQ score                 |                 |              | Intent to remain |                 |              | Performance index |                 |              |              |
|                                     | Industrial Firm           | Accounting Firm | Total Sample | Industrial Firm  | Accounting Firm | Total Sample | Industrial Firm   | Accounting Firm | Total Sample | Total Sample |
| <b>Core job dimensions</b>          |                           |                 |              |                  |                 |              |                   |                 |              |              |
| Skill variety                       | -0.49†                    | -0.39§          | -0.36§       | -0.48†           | -0.41§          | -0.37§       | —                 | -0.21†          | —            | -0.20†       |
| Task identity                       | -0.47†                    | -0.22†          | -0.23†       | -0.40†           | -0.19†          | -0.19†       | —                 | —               | —            | —            |
| Task significance                   | -0.32†                    | -0.29†          | -0.34§       | —                | -0.23†          | -0.26§       | —                 | —               | —            | —            |
| Autonomy                            | -0.62§                    | -0.32§          | -0.40§       | -0.60§           | -0.24†          | -0.32§       | —                 | —               | —            | —            |
| Feedback from job                   | -0.40†                    | -0.21†          | -0.22†       | -0.43†           | -0.23†          | -0.25†       | —                 | —               | —            | —            |
| <b>Supplementary job dimensions</b> |                           |                 |              |                  |                 |              |                   |                 |              |              |
| Feedback from others                | -0.51§                    | -0.19†          | -0.28§       | —                | -0.20†          | -0.19†       | —                 | —               | —            | —            |
| Dealing with others                 | —                         | —               | -0.16†       | —                | —               | -0.19†       | —                 | —               | —            | —            |
| Overall motivating potential        | -0.59§                    | -0.34§          | -0.37§       | -0.55§           | -0.31†          | -0.34§       | —                 | —               | —            | —            |
| <b>Affective responses:</b>         |                           |                 |              |                  |                 |              |                   |                 |              |              |
| Overall job satisfaction            | -0.54§                    | -0.52§          | -0.54§       | -0.72§           | -0.69§          | -0.72§       | —                 | -0.28†          | —            | -0.16†       |
| <b>Satisfaction with</b>            |                           |                 |              |                  |                 |              |                   |                 |              |              |
| Job security                        | -0.42†                    | -0.42§          | -0.46§       | -0.34†           | -0.41§          | -0.45§       | —                 | —               | —            | —            |
| Pay                                 | —                         | -0.37§          | -0.34§       | —                | -0.37§          | -0.37§       | —                 | -0.24†          | —            | —            |
| Co-workers                          | -0.53§                    | -0.23†          | -0.28§       | —                | -0.26†          | -0.26§       | —                 | —               | —            | —            |
| Supervision                         | -0.41†                    | -0.29†          | -0.34§       | -0.36†           | -0.24†          | -0.29§       | -0.38†            | —               | —            | —            |
| Personal growth                     | -0.55§                    | -0.52§          | -0.55§       | -0.54§           | -0.49§          | -0.53§       | -0.29†            | -0.29†          | —            | -0.25†       |
| Internal work motivation            | -0.31§                    | -0.34§          | -0.28§       | —                | -0.29†          | -0.25§       | —                 | -0.18†          | —            | —            |
| Career facilitation                 | -0.51§                    | -0.51§          | -0.50§       | -0.50§           | -0.46§          | -0.46§       | —                 | —               | —            | —            |

Measured at time period 2.

† $p < 0.05$ .‡ $p < 0.01$ .§ $p < 0.001$ .

TABLE 6. Factor analysis results\* (total sample)

| Rotated factor matrix scores (time 1) | Factor 1 | Factor 2 | Factor 3 |
|---------------------------------------|----------|----------|----------|
| Job content                           |          |          |          |
| Skill variety                         | 0.63*    | 0.06     | 0.28     |
| Task identity                         | 0.68*    | 0.11     | -0.10    |
| Task significance                     | 0.58*    | -0.06    | 0.31     |
| Autonomy                              | 0.74*    | 0.24     | -0.03    |
| Feedback from job                     | 0.66*    | 0.22     | 0.14     |
| Feedback from others                  | 0.18     | 0.12     | 0.63*    |
| Dealing with others                   | -0.02    | -0.03    | 0.80*    |
| Overall motivating potential          | 0.94*    | 0.21     | 0.13     |
| Job Context                           |          |          |          |
| Satisfaction with                     |          |          |          |
| Job security                          | 0.12     | 0.63*    | -0.05    |
| Pay                                   | -0.02    | 0.54*    | -0.01    |
| Co-workers                            | 0.07     | 0.72*    | 0.15     |
| Supervision                           | 0.18     | 0.79*    | 0.13     |
| Personal growth                       | 0.45     | 0.60*    | 0.13     |
| Overall job satisfaction              | 0.23     | 0.65*    | 0.07     |
| Internal work motivation              | —        | —        | —        |
| Eigenvalue                            | 5.19     | 1.82     | 1.29     |

\*Scores exceeding 0.5.

sent factor 2, and dealing with others to represent factor 3.

To examine the relationship between ORS and organizational commitment, regression analysis was then undertaken.<sup>8</sup> In addition to the three variables identified via factor analysis, the following variables were also included in the analysis: age and undergraduate grade point average as control variables, and career facilitation. The results reported in Table 7 indicate that: (1) the control variable undergraduate grade point was significantly related to each of the three commitment variables, whereas age was not; (2) the job content variables were relatively unrelated to commitment, whereas the job context variable (overall job satisfaction) was significant-

ly related to commitment attitudes and intentions, but not the performance index; and similarly, (3) career facilitation was a significant predictor of commitment attitudes and intentions, but not performance. Significant ( $p < 0.000$ )  $F$ -values were obtained when the dependent variable was defined as commitment attitudes (adjusted  $R^2 = 0.35$ ) and intentions (adjusted  $R^2 = 0.50$ ), but not performance.

In general, these results appear to indicate that occupational reality shock associated with the accounting job context and career facilitation are the primary precursors of the accounting professional's commitment. While reality shock with respect to job content also appears to influence the professional's commitment, it does

<sup>8</sup>The correlation coefficients between the commitment measures were as follows:

| Commitment measures           | Pearson $R$ | Significance |
|-------------------------------|-------------|--------------|
| OCQ, intent to remain         | 0.67        | 0.00         |
| OCQ, performance              | 0.15        | 0.03         |
| Performance, intent to remain | 0.24        | 0.01         |

The coefficient between OCQ and Intent to Remain is sufficiently high as to suggest the potential use of canonical correlation analysis; however, regression analysis was utilized for ease in the interpretation of the resulting coefficients.

TABLE 7. Regression analysis results\* (total sample)

| Independent variables        | OCQ              | Dependent variables |                   |
|------------------------------|------------------|---------------------|-------------------|
|                              |                  | Intent to remain    | Performance index |
| Control variables            |                  |                     |                   |
| Age                          | 0.04<br>(0.13)   | 0.01<br>(0.70)      | -0.005<br>(0.82)  |
| Undergraduate grade point    | -0.57<br>(0.002) | -0.42<br>(0.05)     | 0.33<br>(0.04)    |
| Job content                  |                  |                     |                   |
| Overall motivating potential | -0.001<br>(0.29) | -0.001<br>(0.63)    | -0.001<br>(0.47)  |
| Dealing with others          | 0.02<br>(0.84)   | -0.04<br>(0.64)     | -0.05<br>(0.50)   |
| Job context                  |                  |                     |                   |
| Overall job satisfaction     | -0.27<br>(0.000) | -0.63<br>(0.000)    | -0.06<br>(0.24)   |
| Career facilitation          | -0.24<br>(0.002) | -0.17<br>(0.05)     | 0.004<br>(0.95)   |
| $R^2$                        | 0.38             | 0.52                | 0.06              |
| Adjusted $R^2$               | 0.35             | 0.50                | 0.02              |
| F value                      | 15.53<br>(0.000) | 27.45<br>(0.000)    | 1.60<br>(0.15)    |

\*Significance levels are presented in parentheses below the regression coefficients.

so to a far lesser degree. These results suggest that accounting organizations may be able to increase their ability to retain desired employees, and to a lesser extent induce higher levels of performance, by managing the extent to which reality shock is experienced with respect to job context and career expectations. Such action appears particularly compelling in light of recent findings by Jackofsky *et al.* (1986); they observed that turnover for professional accountants was greater for not only the lower performers, but also the highest performers.

### CONCLUSIONS

In the case of professional accountants, ORS may result from unmet expectations with respect to professional norms and values, the specific organizational setting, and the specific job content. In this study, we investigated the impact of the reality shock associated with job content, job context, and career facilitation on

the commitment attitudes, intentions, and behavior of professional accountants from two organizational settings.

The findings indicated that accountants do experience unmet work expectations and that this phenomenon is related (in a correlational sense) to their organizational commitment attitudes, intentions, and to a lesser extent behavior. The findings were observed to vary between organizational settings but not in an apparently systematic fashion; reality shock was found to be present in both environments, but to a somewhat lesser degree in the industrial firm setting. In addition, the relationship between ORS and commitment was found to be asymmetrical: unmet expectations were found to be negatively correlated with organizational commitment, whereas surpassed expectations and commitment were found to be unrelated.

The consistent, negative relationship observed between the study variables and the organizational commitment measures suggests that accountants' commitment attitudes and in-

tentions may be increased if ORS can be managed or reduced. Several organizational strategies might be pursued to achieve this. First, during the interview phase of professional staff recruitment, an attempt might be made to identify those potential employees with unrealistic expectations, and hence most likely to experience a high degree of reality shock. Screening potential employees in this fashion could result in hiring the set of job candidates with the most realistic work expectations.

A second strategy might involve the utilization of job previews during the organizational entry phase. Job previews have been used as a means of establishing realistic work expectations and have been found to have a significant, positive relationship with employee job survival

(Wanous, 1980). Dean & Wanous (1984), for example, observed that new employees who had received a realistic job preview and subsequently terminated, tended to quit within the first few weeks of employment. They argued that this early turnover saved the employer significant training costs, and in addition, helped extend the work-life expectancy of retained employees.

In conclusion, while the notion of reality shock is well recognized in the profession of accounting, this study has attempted to define its sources and the impact of its outcomes. While strategies to cope with this phenomenon have been suggested, further research might investigate the efficacy of each.

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## APPENDIX. JDS VARIABLE DEFINITIONS

### Core Job Dimensions:

Skill Variety — the extent to which the employee expects to use a variety of skills;

Task Identity — the extent to which the employee expects to perform a whole and identifiable piece of work;

Task Significance — the perceived importance of the employee's task;

Autonomy — the freedom to work without close supervision;

Feedback from Job — the amount of feedback provided from doing the job.

### Supplementary Job Dimensions:

Feedback from Others — the amount of feedback received from other people in the workplace (e.g. co-workers, supervisors);

Dealing with Others — the extent to which the job requires interaction with other people (e.g. co-workers, clients).

Overall Motivating Potential — a summary measure of the motivational potential of a job based upon the five core job dimensions.

### Affective responses:

Overall Job Satisfaction — an overall measure of the extent to which an employee is satisfied with the job.

Specific Satisfaction — the extent to which an employee is satisfied with (a) job security, (b) pay and other compensation, (c) peers and co-workers, (d) supervision, and (e) the opportunity for personal growth and development on the job.

Internal work motivation — the extent to which an employee is self-motivated to perform.

## FINANCIAL ACCOUNTING: IN COMMUNICATING REALITY, WE CONSTRUCT REALITY\*

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At first I saw Don Juan simply as a rather peculiar man who knew a great deal . . . but the people . . . believed that he had some sort of "secret knowledge", that he was a "brujo". The Spanish word brujo means, in English . . . sorcerer. It connotes essentially a person who has extraordinary . . . powers.

I had known Don Juan for a whole year before he took me into his confidence. One day he explained that he possessed a certain knowledge that he had learned from a teacher, a "benefactor" as he called him, who had directed him in a kind of apprenticeship. Don Juan had, in turn, chosen me to serve as his apprentice, but he warned me that I would have to make a very deep commitment and that the training was long and arduous . . .

My field notes disclose the subjective version of what I perceived while undergoing the experience. That version is presented here . . .

My field notes also reveal the content of Don Juan's system of beliefs. I have condensed long pages of questions and answers between Don Juan and myself in order to avoid reproducing the repetitiveness of conversation . . . (*The Teachings of Don Juan: A Yaqui Way of Knowledge*, Carlos Castaneda, 1970, pp. 14, 24, 25).

We stood together, looking down into the valley below . . .<sup>1</sup>

"What do you see before you?" said the Master.

"Well, in the valley, I see buildings of various kinds, spread over a large area, and surrounded by a fence. There are people inside the fence. A river runs through the valley, and through the area enclosed by the fence. And outside the fence there are trees, up the sides of the valley, all around, as far as the eye can see."

"And do you know what it is, that you see?"

It seemed to me that I had accurately, though briefly, described what I saw. But I was used to such questions from the Master. It was his way of guiding me along the path of the special knowledge which he possessed, and which he had decided to impart to me, as his apprentice. I recalled our previous conversation:

"Is this an 'organization', perhaps?"

He smiled faintly, and looked at the far hills:

"That is good, you recall our last lesson. You are partially right. Part of what you see is an organization."

"Well, I really only meant what lies within the fence."

"Yes I know you did, but again, only part of that is the organization . . . And indeed, part of the other is also the organization."

"Part of the other? You mean, what lies outside the fence — the hills and trees — they are also part of the organization?"<sup>2</sup>

"Not the hills and trees, as such, but . . . We must not get out of our depth before we can swim. The hills and trees must wait."

"Well then, which parts, within the fence, are part of the organization? I suppose the buildings and land are part of it?"

"In all likelihood, they are. But not necessarily."

"What about the river? It must be because I can see that the river water is being used by the organization. I can see . . ."

"Yes you are right. The river supplies water vital for the manufacturing processes of the organization, but nevertheless, the water of the river is not considered to be part of the organiza-

\*The author thanks the anonymous reviewers and Michael Miko for their helpful comments.

tion . . . Unless of course the organization is sold. If it is sold, then whoever purchases the organization will pay for the water of the river, and, it being thus recognized, will become part of the organization. It will be named 'Goodwill'."

"The river — the water — will be called 'Goodwill'? Good Heavens. Is there anything else of this nature?"

"What do you mean 'of this nature'? One must be clear in one's own mind, as to what it is precisely that is being questioned."

"I mean, ugh, in a sense, the river does not exist . . ."

I hurriedly reflected on past conversations. I did not want to appear to be stupid before the Master. I tried to convey my question according to the language which communicated his special knowledge:

"The river — the water in it — only becomes an 'asset' of the organization, when the whole organization is sold. At that point, the point of sale, it becomes part of the organization's reality. Like a miracle. Is there anything else . . . of that nature?"

"Excellent, you see what clarity of mind can achieve? You are a fine apprentice. You will be a Master yourself someday. And in answer to your question, everything is of this nature."

Now, that point in time, when something becomes real, when we *recognize* the reality of something, what point in time might that be called, do you imagine?"

"Well, I would call it the point of *real-ization*, since that is the point at which things become real."

"And so we do. That is just what we do. Do you see, are you beginning to see, where our power lies?"

"Yes, I think I am beginning to see. I think I understand about the water. What other things are real-ized at certain points in time, which you decide?"

"Oh everything, everything! We decide everything. Remember we talked about revenue: revenue less expenses equals profit. Remember?"

"Yes."

"When do you think something becomes revenue?"

"When it is real-ized?"

"That's right. We recognize revenue when it is realized: that's what we say — 'we recognize revenue and gains when they are realized'. We create the impression that they do not exist, and that suddenly, they become real, and we recognize them as such. But of course, we make them real, by recognizing them as real.<sup>3</sup> Until we recognize them, they are, for just about all intents and purposes, not real."

"But aren't they there? I mean, if they are there . . ."

"Again, clarity of mind. What do you mean exactly when you say, 'if they are there'?"

"I mean, if they exist, then, even without you recognizing them, they are real."

"Oh yes, that is our everyday concept of reality alright. But everyday concepts are a cover-up. Did 'black holes' and 'subatomic particles' exist, before physicists created the idea of them?<sup>4</sup> Of course they did not!"

"But . . ."

"Oh yes, I know, you're a literal sort of chap; you will be a fine master. But even with your literal mind, do you believe everything you read and hear? What about the newspaper? Are all those stories real?"

"Well, I suppose it depends what you mean by 'real'. I mean, I think, some of them are true."

"Unbiased, neutral, do you mean?"

"Well, yes."

"Do you seriously think that anything in this world can be 'neutral'?"

"Yes, well, ugh, I'm not sure . . ."

"Do you think there ever was a news story that took everything into account; left out nothing; gave the full picture?"

"It depends what you mean by 'the full picture'."

"What do you mean by it?"

"Agh, I don't really know. Ha. Ha."

"Yes, good, now we are getting somewhere. You 'don't know'! Who knows what 'the full picture' is? Who knows? How do you know when you have the full picture?"

Having the full picture — a true, a fair view of something — depends on people deciding that they have the full picture. Sometimes, they later

decide they did not have the full picture, and then there are recriminations: why didn't we get the rest of the picture; or a different picture? It can go on and on. People feel entitled to reality.

Did you study history at school?"

"Yes, I did."

"History creates past reality for us. The past is always being reinterpreted. They are always rewriting the history books. They don't tell you that at school though, do they? What about history in your own time: Vietnam, for example? You must admit, accounts have changed over the years.<sup>5</sup> Or what about the Bible, is that 'real'?"

"I do see what you are saying, but science is different. It describes real things, physical things."

"No, my boy, you are quite wrong. A black hole — my dear fellow, what is it exactly that the physicists say is a "black hole"? Certain areas in the Heavens produce certain bewildering experimental results . . . That is all. And these areas are called 'black holes'. By naming them, we suggest that we have named, 'discovered', something: something real. But my boy, 'black holes'? Even you must see.

Black holes are an idea, a metaphor, a concept. Like atoms. Like electrons. Like organizations! These things help structure our lives. Ideas.<sup>6</sup> Where would we be, without ideas? But I am going much too fast. Where were we?"

"We were talking about revenue and gains, and their point of recognition . . . and realization."

Oh yes, that's right. 'We recognize revenue when it is realized'. By *naming* it 'revenue', it *becomes* revenue . . . just like the black holes."

"How do you know when to recognize revenue? Or should I say, how do you know when to 'realize' revenue?"

"Now you're getting it . . . Revenue is generally recognized — considered to be realized — at the point of sale, but not always."

"Why at the point of sale?"

"This is when goods are considered to leave the organization, and to become the property of someone else."

"When the goods are taken away, you mean?"

"No. The goods do not have to actually leave

the organization. They merely have to be thought of as having done so. See those big containers down there, beside the square building over on the right? Those goods may well be sold."

"So, you are saying, goods are 'sold', when they are conceived of, as having left, the idea of 'the organization'?"

"Very good."

"How do you determine when to think of them as having left the organization?"

"Oh it varies. We have a lot of discretion here. It is all arbitrary of course, but we take into account various factors. You cannot just arbitrarily define these things: they have to be seen to be the product of experience, judgement."

"Why?"

"Well, otherwise, anyone could do the job."

"Oh yes . . . But, agh, I mean, surely . . .?"

"Yes I know, it's confusing. Let me try and explain: there is no such thing as the truth, but there is such a thing as stretching the truth too far. There is a reality: there's something there alright. Do not think for a minute that I am saying we imagine the world! Oh no, not at all! The bricks are there, and the people, and those containers — no doubt about it. But the organization, and the most minute particles in the bricks, and revenue, well, we create them!

Now, back to where we were: 'point of recognition', being, point of realization, being, sometimes, but not necessarily, point of sale. There are numerous possibilities. Sometimes we recognize revenue when the goods are completed; sometimes when they are partly completed; sometimes when the customer is invoiced; or even when he telephones and places an order; or sometimes when he is billed; or when he pays. And even these are not clear-cut. When is a building 'finished', for example? What percentage of a building — or a sheep — is 'completed'? When does a customer 'pay': when his cheque is received; when it is honoured?"

I felt overwhelmed. There was more here to learn than I had imagined. The Master read my thoughts:

"It is all a bit confusing now, but do not be concerned, you will understand."

"Could we talk about what lies outside the organization, but is part of it?"

"Lad, you are not making sense."

"I mean, you said there were things outside the fence, which were part of the organization."

"Oh yes. Now, do not confuse the boundary of the organization, with the fence — that is just to keep people out. You must not think of the organization as ending at the fence — that is common sense. That is the way lay people think of the organization. Remember, we are professionals."

Now, you see all these trees? The land on which they stand, belongs to the government, but the organization is able to take trees from this forest for its paper manufacturing. That's a curly one, isn't it? How would you account for that?"

"Well, I suppose the land is not an asset of the organization, not part of it, so as to speak, but the trees are, for as long as the organization is allowed to take them . . .

But it doesn't make sense to exclude the land and include the trees — the trees are part of the land . . .?"

"In reality', you were about to say?"

I felt stupid.

"Remember, we are creating reality. We do not have to be constrained by the everyday way of thinking — it is just a way of thinking, can't you see? As ordinary people, we arbitrarily combine, and define, and add, and subtract things from our picture of reality. As professional people, we arbitrarily combine, and define, and add, and subtract things, in a different way to the everyday way: that is what differentiates us.

The fence does not designate the organization. We do that. We designate it, by deciding what things will be part of the organization, and by deciding how big or small these things will be: 'recognition' and 'measurement' . . . Come over here . . . You see that murky brown in the river, downstream of the plant? What would you say of that?"

"It's pollution."

"Yes, but do you think it is part of the organization? Now try to forget about the fence."

"Well, ordinary people would say it is . . . So,

ughm, perhaps an accountant would say it is not."

"It is not quite as simple as that. We do not always define reality differently to the common conception. Quite the contrary. In fact we play such a large part in creating the common conception, and we have so largely absorbed the common conceptions into our own thinking, that one cannot, by any means, assume that our definitions are always the contrary of lay definitions. In this case, you are right in saying that most people would see the pollution as being, in some way or another, part of the organization. They used not to. They used to be quite unaware of it. But since they have become aware of it, and because they are beginning to see it as being the responsibility of the organization, we inevitably must do so, in time. Once the organization becomes accountable for something, we must account for it, sooner or later."

"I'm still not sure I understand. Before, you said you don't have to be constrained by ordinary people's notions."

"That's the paradox. That's where we walk a very thin line. We communicate reality: that is the myth; that is what people believe. It is even what most of us believe. And, in a sense, we do communicate reality. There is something there: bricks and people and so on. And the organization can, say, be 'doing well', or 'doing badly', in whatever sense you take that to mean. And it is our job to convey it. But what is 'the full picture'? There is no full picture. We make the picture.<sup>7</sup> That is what gives us our power: *people think and act on the basis of that picture!* Do you see? Are you beginning to see?"

"Yes . . . I think I am beginning to see. My word, there's a lot more to it than I realized . . . Real-ized . . . Ha, ha, yes I see, 'realized': we say it all the time, don't we? We think we have grasped reality, when we 'realize'; but really, ha, ha — there I go again, 'really' — but we have not so much grasped reality, as created it, by thinking of it in a certain way, and treating it in that way!"

"Good, good, well done! Now, most things, we are free to define, and shape, and mould, and measure, without interference. But when people have a preconceived notion of what reality is,

well, we can't afford to go against it!"

"Why not?"

"Because, we are supposed to communicate reality: if people have a certain conception of reality, then naturally, we must reflect that. Otherwise people will lose faith in us."

"What happens then?"

"Oh, it's terrible, terrible. Hearings, lobbying, investigations, criticisms, public intervention. We seem to get more and more of it these days... But, we were talking about the pollution."

"Yes, I was wondering, how could it be 'measured'?"

"We will come up with something. We always do. No different to the bricks really, or the people."

"How are the buildings measured?"

"At the amount that they cost the organization, generally, although there are other ways."

"And the people?"

"The same."

"Isn't that a bit strange?"

"Why so?"

"Well, bricks and people, measuring them the same way?"

"Oh, I see what you mean... Well, there are people — radical types — who say we devalue things, like people, by measuring them this way. They hate the whole system, I mean the whole thing: reality, as we perpetuate it. They say we are conservatives, defining and measuring things the way they always have been, and not trying to make it any better, not trying to make any changes. But where would we be if we tried to overthrow the system? We are part of the system..."

You see, if we valued people any differently to the way that we do, say we thought this way: 'the more an organization produces, the more boring, injurious, and so on, it is for the workers'. And then, if we were to take this boredom, or injuriousness, into *account*, then people would expect to be compensated for these things; and if people were compensated for these, then the organization would have to charge a higher price for its products. And at a higher price, people would not want to buy so many of its pro-

ducts. They might buy other things instead. And that, would change everything. Everything! People buying less of this, more of that; investing less in this, more in that. Nothing would be the same: some people would be better off, some worse off; we would have less of some goods, more of others. It would change what we call the 'income distribution' and 'resource allocation' in our society. Changing that is major; that is social change.

That pollution, for example: what if that is included in the picture? It would not help that organization, would it? The more goods it produced, the more pollution. Not a pretty picture. It would have consequences."

"And you could do all that! It's incredible!"

"Well, we could not do something as big as that on our own. Social change... we could not change the picture as radically as that, and get away with it. But the day will come, when people so clearly 'see' pollution as part of the organization, that we will have to include it in the picture. And there will be consequences..."

So you see, it's not we alone that create reality. Everyone does it. But as official Communicators of Reality, we have more power than most."

"Hmm... It's very interesting... So, ah, if that happens, I mean if people come to 'real-ize' pollution as part of 'the organization', and you have to 'measure' the pollution, I don't see how you can do it? It doesn't cost the organization anything. Other people pay."

"We will work something out. Getting consensus on it though, that's the problem."

"I suppose people don't think it's real — the real measurement, the true one — unless they can see you all agree about it."

"That's right. That is right. It is very bad for people to see us quarrelling amongst ourselves. It lowers their confidence. It lowers our own confidence too."

"Yes, I suppose people wouldn't be happy to see that their world is so... tenuous. I feel unsettled by all this myself."

"Yes, they need us. Everything would be in a mess without us. Just a jumble. No-one would know where they were. How would that work, eh?"

"Is that why some people have called you the 'handmaidens of the status quo'?"

"Ha, ha . . . Where did you hear that?"

"Oh, I don't know."

"Well, it is not us, that they call the handmaidens of the status quo. We just do our job. It is the people who make up theories about us. They do not really question what we do. They take it all at face value. They adopt the same perspective we do. Our work is officially designated as Communicating Reality, and they just accept that is what we do. A communication perspective; measurement perspective; information perspective; that sort of thing. They never suspect we play a role in *constructing* the status quo."

"Oh, I see."

"They see our job as a technical one — measuring and communicating reality. Like ordinary people, they think that there is a pre-existing reality, which we reveal. They even say that some people can 'look behind'<sup>8</sup> accounting numbers; that they can 'unravel'<sup>9</sup> them. Imagine! People are not 'fooled', they say. Well, I don't know about that! Hmmm, I don't know about that!

Some of our methods, according to these fellows, are 'trivial', 'cosmetic': these methods do not convey anything new about reality, and so sophisticated people do not react to them. People who react to these 'arbitrary', methods, they say, are stupid. They call them 'functionally fixated'. Imagine, 'functionally fixated'! Other methods, they say, are 'substantive': these methods carry additional information content about reality, and so people react to them.

This, my boy, is what can come of not being clear in your mind about what reality is, and what 'information' is. It never occurs to these chaps, that information plays a part in creating reality.<sup>10</sup>

Well, the theorists, poor chaps have had a dreadful time lately: some of the trivial methods seem to be real — they have consequences; some of the real ones do not seem to have any consequences,<sup>11</sup> people act as if they do not believe in their theories. Oh, a merry dance! Still, it suits us."

"Why?"

"It keeps them busy. They don't interfere.<sup>12</sup> Where would we be if the whole thing was unmasked? . . . Still, we could do with a bit of help at present . . ."<sup>13</sup>

"Does everyone think that way? I mean, the theorists, surely some of them suspect?"

"Oh yes, some of them do! But it is up-hill going for them. How do you get it across, that we play a part in creating reality, when everyone *knows*, with conviction, that reality exists unproblematically, out there! How do you start to say something like that? 'Yes, yes, of course, there *is* a reality, *but* . . .' People do not want to hear that sort of thing. You can't blame them."

"No . . . Gosh! To be honest, I didn't realize how fascinating this could be. It's really very interesting!"

"Oh yes. It doesn't have to be dull you know. It all just depends on the way you look at things."

"I've been wondering, do people ever decide that the accounts of an organization *don't* represent reality?"

"Oh yes, that does happen. Always embarrassing. People get very upset indeed."

"Could you give me an example?"

"Company failures. They, are our *bête noire*. The accounts sometimes present a picture of a healthy organization, and then, it fails. We never hear the end of it! People say: 'if this organization's accounts were so untrue, what about other organizations?' As I said, there is no truth as such, but there is such a thing as stretching it too far — that is when you get caught out.

You see, normally a healthy-looking set of accounts will get an organization through difficult times . . ."

"Save it? Save it, do you mean?"

"Yes. If the accounts look alright — so be it! Who is going to panic? An organization will generally get through rough waters as long as no-one rocks the boat.

But if the accounts suggest an organization is going to fail, so be it! Say, we lift what we call the 'going-concern' assumption, and prepare the accounts of an organization on the basis of liquidation values rather than costs. What do you think will happen?"

"People would panic, and the organization



would fail."

"Self-fulfilling prophecy. And people would blame us! Mark my word. They would say we *made* it happen! Ironical, isn't it?"

"It certainly is."

"So, no-one in our business likes to prepare accounts which make an organization look bad."

"Do you feel right about that? I mean, I see now that there is no truth, as such, but, uhm, as you said, stretching the truth..."

"Look, many tribes have witchdoctors. They can will a man to death. Do you want us doing that?"

"No, of course not... Gosh, you have so much power... You know, now that I am beginning to see it, I don't understand how all this has not come out. I mean, I'm thinking about all sorts of things: what we consider to be 'objective', what we consider to be 'rational', the way we think, the way we act, our theories, the way our society is structured — it's not real in the way we think it is. It's all just an *idea*, isn't it?"

"That's right my boy. Just an idea. And by acting in accordance with it, we make it so! "If men define things as real, they are real in their consequences."<sup>14</sup>

We create a picture of an organization, or the

'economy',<sup>15</sup> whatever you like, and on the basis of that picture (not some underlying 'real' reality of which no-one is aware), people think and act. And by responding to that picture of reality, they make it so: it becomes 'real in its consequences'.<sup>16</sup> And, what is more, when people respond to that picture, and the consequences occur, they see it as proof of our having correctly conveyed reality. Clever, isn't it? That is how society works."

"So, you're saying that anyone charged with the responsibility of providing these pictures, has a lot of power, because people will respond to what they draw-up?"

"That is so."

"It seems to me, that your power is a hidden power, because people only think of you as *communicating* reality, but in communicating reality, you *construct* reality."

"That's right. A hidden power. And all the more potent for it. This may sound silly to you, but most of us are only just beginning to realize ourselves that we have this power. We always thought of ourselves as being technical people. But it has been becoming clear lately, that there is much more to our work. Much more..."

## NOTES

<sup>1</sup> The process by which society is created is subtle. If individuals were to be self-consciously aware of the constructed nature of society, and the part they play in creating and sustaining it, society would not function effectively.

Every word, gesture and deed on the part of an individual or group is either, in conformity with social mores and thus contributes to the maintenance of society as it is, or is deviant and will be tolerated only in small degree, unless the individual or group can change society — the latter is the story of minority voices and groups.

Contrary to commonsense intuitions, reality does not concretely exist independently of the concepts, norms, language and behaviour of people. People create society, but at the same time, their concepts, norms, language and behaviour, become institutionalized. By becoming thus objectified, society acquires a semblance of concreteness. Indeed it is more than a semblance, as anyone who breaks the rules of social convention quickly learns.

Many readers of this paper will have already lost patience with it, because it does not accord with the norms of academic reality. Every properly socialized person responds to deviance in this way. Thus, society is stabilized, and protected from change — but, in this way also, many interesting things slip past our notice... By taking for granted those things which others take for granted, we fail to understand how those things arise, and how they are sustained, through being taken for granted and thereby forming the basis for thought and action. By taking for granted, and rigorously studying, things as they are, one merely builds on lay conceptions, becoming an expert of description, and a collector of "facts". But too close an attention to the "facts" leaves unquestioned how the facts arise — it leaves us bereft of deep explanation.

Academic discourse frequently functions as a stabilizer of society. Conferred with authority and legitimacy by a social ideology which holds that academics engage in expert and free thought, research of social "facts" plays the important role in society of objectifying, normalizing, and so perpetuating those "facts" and the interests and power relations which give rise to them.

The "facts" of society such as "crime", "profit", "madness", "marriage", "organizations", "sexuality" and "assets" are generally taken for granted, but authors such as Berger & Luckmann (1966), Berger & Kellner (1964), Bittner (1965), Foucault (1967, 1977, 1981), Garfinkel (1967), and Giddens (1976, 1984), whilst viewing social reality from different theoretical and methodological perspectives, all recognize that the facts of society do not pre-exist social practices, but are created and sustained by social action.

Crime, profit, madness, and so on, are socially constructed categories — they are definitions of reality or "ways of seeing". Social power accrues to those who can influence conceptions of reality, since by influencing conceptions of reality — what is considered to be "rational", "moral", "true", "efficient" — one influences social action.

Hines (1986a, 1987) shows how mainstream financial accounting research is based on taken-for-granted commonsense conceptions and assumptions, which mitigate against the questioning of how social reality arises and is maintained and legitimized, and which therefore obscure the roles that financial accounting plays in the creation and maintenance of society. Mainstream financial accounting research represents a "way of seeing" similar to the commonsense "way of seeing", but in the words of Poggi (1965), a way of seeing is also "a way of not seeing".

It is necessary to *breach* a way of seeing or worldview, in order to create a new way of seeing (see especially Handel [1982, pp. 55–77] and Mehan & Wood [1975, pp. 3–33]). Castaneda's master, the sorcerer Don Juan, refers to breaching a worldview as "stopping the world". "Stopping the world", or dissolving our taken-for-granted conception of reality, and thereby seeing that it is essentially arbitrary and constructed rather than "true", is the first step to gaining a new reality or a new way of "seeing" (Castaneda, 1971, 1974). It was some years before Castaneda began to be able to stop his world, and to see how that world which he had taken for granted and had seen as pre-existing his own and others' action, was socially constructed by the thought and action of himself and others. He was then empowered to experience a new reality, that of Don Juan.

A touching aspect of Castaneda's early apprenticeship to Don Juan, is his dedication to pursuing what he sees as rigorous research procedures. Eventually Castaneda comes to recognize that these procedures merely serve to sustain his taken-for-granted world, and to prevent him from discovering an alternative world.

Whilst it is recognized in some management accounting research and organization behaviour research, that accounting practices, as well as communicating reality, also play a part in creating, sustaining and changing social reality, this view of accounting is not "seen" in mainstream financial accounting research. The present paper represents an attempt to momentarily breach or "stop the world" of mainstream financial accounting research.

<sup>2</sup> Reality does not exist independently of accounts of it. As Meyer (1983, p.236) states, an organization, "is in fact a sprawling, complex institution, with multiple purposes and disconnected programs (technologies), of unknown production functions, of competing and autonomous subordinate units". But accounting imposes a conceptual boundary on it: "the accountants settle the matter by definition, and acquiring boundaries means, for an organization, acquiring reality" (p. 236).

Hines (1986b) shows how the financial accounts of an organization do not merely describe, or communicate information about, an organization, but how they also play a part in the construction of the organization, by defining its boundaries. An organization is not a concrete thing, but a set of interrelationships, and if it is to exist, then it must somehow be bounded or defined. Financial accounting controversies are controversies about how to define the organization. For example, what should "assets" and "liabilities" include/exclude: at what point does an asset/liability become so intangible/uncertain/unenforceable/unidentifiable/non-severable, etc., that it ceases to be considered to be a "part" of an organization? The answers to questions such as these, define the "size", "health", "structure" and "performance", in other words, the reality of an organization.

<sup>3</sup> When the constructed nature of social reality is recognized, it becomes readily understandable why, for example, the Financial Accounting Standards Board (FASB, 1984) was unable, in its Conceptual Framework, to divorce measurement from recognition. It is difficult to "measure" something, before it has been made real, that is, "realized"!

<sup>4</sup> Gribbin (1985) elaborates how subatomic particles, and other conceptions of physical reality, are the artefact of observation and measurement procedures:

The only things we know about the quantum world are the result of experiments . . . The electron is created by our process of experimental probing. The story stresses the fundamental axioms of quantum theory, that no elementary phenomenon is a phenomenon until it is a recorded phenomenon. And the process of recording can play strange tricks with our everyday concept of reality (pp. 209–210).

In the 1930s physicists were intrigued by the prediction of another new particle, the neutrino, required in order to explain the subtleties of the spin interactions of some radioactive decays. "I am not much impressed by the neutrino theory" said Eddington, "I do not believe in neutrinos". But "dare I say that experimental physicists will not have sufficient ingenuity to make neutrinos?"

Since then, neutrinos have indeed been "discovered" in three different varieties . . . Can Eddington's doubts really be taken at face value? Is it possible that the nucleus, the positron and the neutrino did not exist until experimenters discovered the right sort of chisel with which to reveal their form? Such speculations strike at the roots of sanity, let alone our concept of reality. But they are quite sensible questions to ask in the quantum world. If we follow the quantum recipe book cor-

rectly, we can perform an experiment that produces a set of pointer readings that we interpret as indicating the existence of a certain kind of particle. Almost every time we follow the same recipe, we get the same set of pointer readings. But the interpretation in terms of particles is all in the mind, and may be no more than a consistent delusion (p. 162).

<sup>5</sup> See, for example, Tucker (1981). For different accepted versions of the Cuban Missile Crisis, see Allison (1969).

<sup>6</sup> It is now acknowledged by philosophers of science that predictive success of a theory does not necessarily infer the "truth" of a theory. Many theories in the history of science which were (are) empirically successful, have been established to be non-referential, that is, not descriptively valid, with respect to their central explanatory concepts. These include the humoral theory of medicine, the effluvial theory of static electricity, the caloric theory of heat, the vibratory theory of heat, the theory of circular inertia, and theories of spontaneous generation (see Laudan, 1981 and 1984, for many others).

Conversely, many theories which are presently considered to be genuinely referential theories, were previously rejected, because of their apparent empirical failure. For example, the chemical atomic theory in the eighteenth century was so unsuccessful, that most chemists abandoned it. Wegener's theory of plate tectonics, published at the beginning of this century, was ridiculed on the basis of its empirical support, until the 1960s, when it became geological orthodoxy.

Furthermore, according to the formal rules of logic, the predictive success of a theory does not logically infer the descriptive validity of a theory (Hesse, 1975). For example, alternative theories can predict equally well. Laudan (1977) discusses many cases of scientific theories which successfully predicted, but were eventually determined not to be descriptively valid.

Feyerabend (1978), Kuhn (1962) and Laudan (1981, 1984) illustrate by reference to many episodes in science, that scientific observations and theories, are a product of a researcher's expectations, sensory impressions, cognitive processes, research methods, ideological prejudices, epistemological assumptions, categories and assumptions embedded in their language, and auxiliary theories such as measurement theories. Gribbin (1985) and Pickering (1984) illustrate this in relation to atoms and quarks respectively.

A growing literature describes the processes by which theories and knowledge are socially constructed and negotiated, for example, [Gilbert (1976), Latour & Woolgar (1979), Myers (1985) and Schuster (1984)].

Foucault (1967, 1977, 1980) goes even further, to show how socially constructed "truth" and "knowledge", are the product of interests and power relations [see also Dreyfus & Rabinow (1982) and Racevskis (1983)].

From the perspective of Foucault's writings, it may be suggested that it is not merely chance that has determined the pre-eminence of positivist financial accounting research, such as capital market research and agency theory. Since this type of research uncritically and unreflectively investigates "what is", without questioning how the status quo arose, and is ongoingly sustained and legitimated, such research legitimizes, rather than threatens, the social, political and economic interests vested in the status quo. It is thus the type of research that will be encouraged, admired and funded by those interests.

<sup>7</sup> The themes in this paper emphasize the constructionist view of society, because it has not generally been acknowledged in mainstream financial accounting research, that social reality, whilst tangibly pre-existing the individual, arises interactively with social action. It is therefore in an effort to partially redress this imbalance, that the constructed nature of social reality has been emphasized in this paper.

Various critiques have been made of the constructionist viewpoint for its neglect of social structure (for example Giddens, 1976). However, the present paper, whilst emphasizing that people construct social relations and social structure in an ongoing fashion, also recognizes that social structures, such as organizations, pre-exist the individual. As the title of this paper reflects, social reality exists tangibly, and accounting practices *communicate* that reality, but in so doing, such practices play a part in creating, shaping and changing, that is, in *constructing* reality. Thus the overall theoretical position of this paper corresponds more to the position of Berger & Luckmann (1966) or Giddens (1984) [although these are not unproblematic perspectives — see, for example, Smith & Turner (1986)].

<sup>8</sup> Beaver (1973, p. 51).

<sup>9</sup> Holthausen & Leftwich (1983, p. 81).

<sup>10</sup> When accounting is seen as merely reflecting or communicating or monitoring the characteristics of organizations, then many accounting methods are seen as "cosmetic" or "arbitrary" and it is supposed that investors can "see through" these methods to the "real" company. Indeed early efficient markets research tested for those methods and standards which were "cosmetic". Moreover, certain accounting changes and standards were held as being "cosmetic", and market efficiency was tested on the basis of this maintained assumption. However, no clear or consistent picture emerged from this research as to which methods, issues or standards are indeed "cosmetic" i.e. do not have "information content" about reality (Lev & Ohlson (1982), Hines (1984)). This state of affairs ceases to be surprising or to seem anomalous, when it is acknowledged that reality does not pre-exist financial accounting practice, but rather arises reflexively and interactively with *inter alia* financial accounting practices.

Such a recognition also throws light on why companies have so strongly opposed apparently "cosmetic" accounting standards, and why their managements have gone to such lengths in order to mitigate the effects of them. It is not necessarily that

managements do not believe or do not understand the Efficient Market Hypothesis, it is rather that they do not think of their company's "size", "performance", "stability", etc. as existing concretely and independently of financial accounting practices, so that sophisticated investors can "see through" accounting numbers to it. For this reason managements often go to expensive lengths, in order to manage their company's appearance [see Wyatt (1983) for some of these costly circumventions of accounting standards].

<sup>11</sup> For example, the stock market does not appear to react to replacement cost disclosures, but it appears that it may react to depreciation changes (see Lev & Ohlson, 1982).

<sup>12</sup> "A frequent topic of debate in the literature is the impact of accounting research on the accounting profession; the general conclusion is that the direct impact has been minimal" (Ball & Foster, 1982, p. 166).

<sup>13</sup> The accounting profession in Europe, the United States and Australia, is increasingly attracting investigation and governmental intervention. The following statement was made by Arthur M. Wood, chairman of the Public Oversight Board of the Securities and Exchange Commission practice section of the AICPA division for CPA firms:

This is a critical time in the history of the accounting profession. To believe that the crisis exists because of the hearings being held by the House Subcommittee on Oversight and Investigations is in my estimation a serious error. Congressman Dingell's hearings are a symptom, not a cause. The cause of this crisis is in fact that investors and depositors are losing faith in the ability of the accounting profession to perform the job that has historically been its unique function: assuring the integrity of the financial information on which our capitalistic society depends (From "Statements in Quotes", *Journal of Accountancy* (August, 1985, p. 142)).

<sup>14</sup> Handel (1982, p. 36), first stated by W. I. Thomas in the 1930s. Handel (1982) and Mehan & Wood (1975) elaborate how assumptions about reality predispose one to interpreting events in harmony with those assumptions. When acted upon, these assumptions perpetuate or create the conditions that one already assumed to have existed.

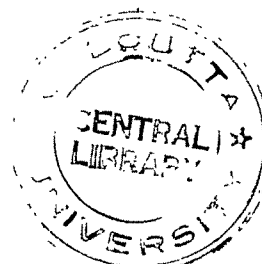
<sup>15</sup> See Miller (1986) for a review of Fourquet's *La Comptes de la Puissance* (Encres, Editions Recherches, 1980), which shows how national accounts are instrumental in shaping economic behaviour.

<sup>16</sup> See Zeff (1978) for discussion of the power struggles which have surrounded a number of U.S. accounting standards, as various groups have sought to impose their definition of reality, and the consequences of it, upon society.

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## THE MEASUREMENT OF MEANING IN ACCOUNTING: A CRITICAL ANALYSIS OF THE PRINCIPAL EVIDENCE\*

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### Abstract

The process of communication between preparers and users of accounting information involves, in part, the sharing of meaning between those parties. Using the framework of Osgood *et al.* (*The Measurement of Meaning*, University of Illinois Press, 1957), Haried [The Semantic Dimensions of Financial Reports, *Journal of Accounting Research* (1972) pp. 367–391, and Measurement of Meaning in Financial Reports, *Journal of Accounting Research* (1973) pp. 117–145] provided a first attempt at the 'measurement of meaning' in accounting. Haried found that the structure within which meaning in accounting was held was different to the standard structure proposed by Osgood *et al.* (1957). Based on the results of measurements of meaning within this structure, Haried (1973) concluded that such measurements were not particularly relevant to accounting research. The present paper presents a critical re-analysis of Haried's (1973) own data. The results are inconsistent with Haried's and show that (1) the structure within which accounting meaning is held is, largely, consistent with the seminal work of Osgood *et al.* (1957); and, (2) the measured meaning of accounting concepts within that structure is consistent with expectations.

The first published attempt at the "measurement of meaning" in accounting was provided by Haried (1972, 1973). This attempt extended into accounting a type of research which had been extensively pursued in other disciplines (Heize, 1969).

Haried's work (1972, 1973) focused on the extent to which various preparer and user groups shared similar meanings for certain representative accounting concepts. He argued that the lack of shared meaning was a sign that communication between groups was not completely effective. For example, if accountants and, say, bankers failed to share similar meanings for the concepts "depreciation" or "goodwill", then communication between the groups which was dependent on those concepts could not occur without error, i.e. the sender's intended message

could not exactly match the receiver's perception of that message. A significant difference in meaning implies a significant difference between the intended and received message. A second issue dealt with by Haried (1973) was the extent to which seemingly synonymous concepts had similar measured meanings.

Underlying the work of Haried (1972, 1973) was the argument that meaning was central to any discussion of communication, and that, given accounting involved communication, meaning was central to accounting. Haried's (1972, 1973) work together with most others dealing with the measurement of meaning were, at least in part, based on the pioneering work of Osgood *et al.*, *The Measurement of Meaning* (1957). Those authors developed a research tool that was capable of quantitatively

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measuring meaning. The tool, known as the semantic differential, comprises a pair of adjectival pairings, one being an antonym of the other (for example: strong-weak, good-bad, fast-slow). Between the adjectival pairings are, normally, seven spaces. Subjects respond to a semantic differential by placing a check mark on one of the spaces between the adjectives.

Instruments based on the semantic differential often have at least ten such scales, and sometimes as many as 30 or more. Thus, a subject would normally give many responses about a single concept. An example of Haried's (1973) semantic differential based instrument can be found in the appendix.

Osgood *et al.* (1957) noted that the meaning measured from this process is connotative meaning, and is distinct from denotative meaning. Within the accounting literature, Karvel (1979, p.33) observed that shared denotative meaning results in "individuals [being] able to agree upon what the message is". Connotative meanings "refer to an accumulation of emotional associations a particular [concept] has acquired" (Bruno, 1980, p.136). Again, within the accounting field, Karvel (1979, p.33) stated: "Connotative congruity is present only when individuals interpretations of reactions to an intended message are similar". Osgood *et al.* (1957) themselves acknowledged that it was connotative meaning that influenced human reactions.

Within the framework of Osgood *et al.* (1957, p.26) the "meaning of a sign has been defined as that point in the semantic space specified by a series of differentiating judgements". The semantic space referred to by Osgood *et al.* (1957) is normally divided into a number of dimensions. This multi-dimensional semantic structure is also referred to in the literature as "cognitive structure" (McNamara & Moores, 1982, amongst others). Haried's research (1972, 1973) measured the cognitive structure within which meaning in accounting was held, and, based on measurements within the structure, determined the extent of any between-group differences in meaning.

Haried (1972, 1973) concluded that, whilst the technique developed by Osgood *et al.*

(1957) for measuring meaning was sensitive and reliable, it measured connotative meaning, and Haried argued that this type of meaning (and by inference, the semantic differential technique) was not particularly relevant in the study of accounting. Haried (1972, 1973) stated that another instrument, which measured denotative meaning, would be more useful.

The basis of Haried's conclusions about connotative meaning and the semantic differential came from certain of his results. In particular, he found that "No important differences in overall meaning between preparer and user ... could be inferred for the ... [accounting] terms" (Haried, 1973, p. 135), when he had expected to find such differences.

There is evidence to suggest that Haried's (1972, 1973) conclusion about the measurement of meaning and the semantic differential had a profound effect on accounting research. Unlike other disciplines where the measurement of meaning within the framework of Osgood *et al.* (1957) was common, research into this aspect of accounting communication is extremely limited. Only two articles have since been published in scholarly journals (Oliver, 1974; Flamholtz & Cook, 1978), and the research leading to one of those, that of Oliver (1974), is said to have commenced prior to the publication of Haried's (1972, 1973) conclusions. In addition, there have been two unpublished studies, one a doctoral dissertation in auditing (Karvel, 1979), the other, a working paper dealing with cognitive structures in accounting (McNamara & Moores, 1982). Given that Haried's (1972, 1973) work was both extensive and without obvious error, it is not surprising that few have chosen to pursue this area of study in accounting.

Haried (1972, 1973) made a significant contribution to the literature. The purpose of this article is, however, to show that the results on which Haried based his conclusions were inaccurate. Based on a re-analysis of certain of Haried's data, this paper concludes that:

(1) the semantic differential is capable of sensitive measurement of an aspect of meaning

relevant to accounting research;

(2) the cognitive structures proposed by Haried (1972, 1973) are not applicable to accounting; and,

(3) the structure that truly underlies meaning in the accounting domain is consistent with that originally proposed by Osgood *et al.* (1957).

The balance of this paper is divided into five sections: Overview of Haried's Research; Haried's 1972 Article; Haried's 1973 Article; Re-analysis of Haried's Data; and, Summary and Conclusion.

### OVERVIEW OF HARIED'S RESEARCH

Both of Haried's articles were, to a very large extent, drawn from that writer's doctoral dissertation (Haried, 1970). His work was in two distinct stages:

(1) the development of semantic differentials relevant to accounting, and the identification of the size and nature of the cognitive structure used within accounting; and,

(2) the refinement of the work in (1) and its application to real world subjects.

Stage one was preliminary and largely exploratory in nature with most of the subjects being students and with concepts chosen in a somewhat casual manner. An important part of Haried's work lay in stage two where, for the first time, between-group differences in meaning were to be measured.

### HARIED'S (1972) ARTICLE

The first stage of Haried's research was published in his 1972 paper and commenced with the difficult task of developing semantic differentials relevant to the accounting domain of meaning.

#### *Development of semantic differentials relevant to accounting*

Consistent with the psychology literature

(see Triandis, 1959), Haried (1972) developed his set of semantic differentials using the "triad procedure". The triad procedure is a set of tasks related to a series of information sets which comprise of three concepts (hence the term *triad*). In Haried's (1972, pp. 380–381) case he presented subjects with several sets of three accounting concepts and requested them to:

1. Decide which of the concepts is different to the other two.
2. Decide what is (are) the characteristic(s) of the one concept that makes it different.
3. Complete the following sentence bearing in mind one or more of the characteristics identified in step (2) above: "The different word is more (less) \_\_\_\_\_ than the other two words."
4. Write down the logical opposite to the word used to complete the above sentence.

In other words the subjects were asked to: (1) identify the "odd concept" of the three, (2) describe the characteristic that made it "odd", (3) again describe the characteristic in a single adjective, and (4) find an antonym for the adjective.

Again, consistent with the previous psychology literature (Triandis, 1959), this procedure was administered to subjects with a minimum of twelve sets of three concepts. From this 30 scales were chosen, those cited more than six times. The subjects for his process were 54 students (both in accounting and otherwise), and 11 practising accountants.

To these 30 scales, Haried added three more, one each for the standard dimensions found in Osgood *et al.* (1957). The 33 scales developed in this way are shown in Fig. 1.

#### *Concept selection*

Haried's (1972, p.384) stimulus concepts were selected on a basis which "was neither as structured nor as critical as that of the selection of scales". In all, eighteen concepts were selected from the terminology of accounting reports. They were said to be "reasonably representative of the semantic domain of interest" (Haried 1972, p.384). They included concepts such as: asset, goodwill, reserve for doubtful accounts receivable, cash flow and net income,



Fig. 1. The semantic differentials developed in Haried (1972).

Beneficial–adverse  
 Certain–uncertain  
 Tangible–intangible  
 Exact–estimated  
 Variable–constant  
 Informative–misleading  
 Objective–subjective  
 Current–past  
 Productive–unproductive  
 Planned–unplanned  
 Safe–risky  
 General–specific  
 Committed–uncommitted  
 Complete–incomplete  
 Permanent–temporary  
 Controllable–uncontrollable  
 Expected–unexpected  
 Real–imaginary  
 Required–discretionary  
 Dynamic–static  
 Flexible–inflexible  
 Long term–short term  
 Cumulative–noncumulative  
 Measurable–unmeasurable  
 Costly–inexpensive  
 Direct–indirect  
 Necessary–unnecessary  
 Common–uncommon  
 Immediate–remote  
 Available–unavailable  
 Good–bad (representing the ‘evaluative’ dimension of  
 Osgood *et al.*, 1957)  
 Strong–weak (the ‘potency’ dimension)  
 Active–passive (the ‘activity’ dimension).

amongst others. There appeared to be no special characteristic of the concepts, nor any obvious bias in their selection.

The order of the concepts was randomised, as was the order of the scales for each of the concepts. However, the order of the concepts was fixed across all subjects and the order of scales fixed for all concepts. This resulted in a 594-item test instrument.

#### *Instrument administration*

This instrument was administered to 92 subjects, half “sophisticated”, half “unsophisticated”. The sophisticated half comprised 18 practising accountants and 28 business administration students; the unsophisticated half, 16 investment club members and 30 non-business administration students.

The observations gathered from the administration of this instrument were factor-analysed<sup>1</sup>, and the factors extracted were then subjected to varimax rotation.

#### *Factor analytic results*

Consistent with general practice, factors with eigen values greater than one were extracted. This produced the factor structure shown in Table 1.

Haried assigned a scale to a factor where the loading was highest and where it was markedly higher than any other factor loading. Thus, a scale which loads only 0.25 could be assigned if all the other loadings are, say, 0.05 or less and a scale which loads 0.48 could go unassigned if the next lowest loading is, say 0.38. The application of Haried’s scale assignment criterion means that whilst “cumulative–noncumulative” is assigned to the fifth factor “time” (factor loading of only 0.36), other scales which are more highly correlated to one or other factors are left unassigned. For example: “productive–unproductive” with a factor loading of 0.45 on the “evaluative” factor, “certain–uncertain” with a loading of 0.42 on the “control” factor and “common–uncommon” with a loading of 0.46 on the control factor are all unassigned. A technique commonly adopted for the assignment of scales is the selection of those which load most heavily (used by both Oliver, 1974; and, Flamholtz & Cook, 1978, for example). Had Haried employed their technique with the commonly used 0.5 cut-off point, his factor structure would have been as shown in Table 2.

The use of this criterion of heavy loadings ( $\geq 0.5$ ) results in somewhat fewer scales with no perceptible loss in interpretability. Haried (1972, p.390) himself recommends the use of a subset of the 26 assigned scales.

One further concern with the nature of this part of Haried’s analysis is the lack of any testing for stability of the factors. Whilst not reported, re-analysis of Haried’s (1972) reported results suggest that the eigen values of his seven factors

<sup>1</sup> Haried (1972) indicated a “principal factors method”. It is assumed that this is the method of analysis now known as “principal components”.

TABLE 1. Haried's (1972) factor matrix after varimax rotation, drawn from Haried (1972) Table 6

| Scales                          | I    | II    | III  | Factors<br>IV | V     | VI    | VII   |
|---------------------------------|------|-------|------|---------------|-------|-------|-------|
| 1. Objectivity                  |      |       |      |               |       |       |       |
| 1. Exact-estimated              | 0.71 | 0.10  | 0.15 | 0.11          | 0.06  | 0.05  | -0.05 |
| 2. Measurable-unmeasurable      | 0.69 | 0.13  | 0.24 | 0.05          | -0.04 | 0.05  | 0.06  |
| 3. Tangible-intangible          | 0.66 | 0.22  | 0.03 | 0.14          | -0.01 | 0.09  | 0.20  |
| 4. Real-imaginary               | 0.63 | 0.14  | 0.11 | 0.09          | 0.13  | 0.14  | 0.27  |
| 5. Objective-subjective         | 0.62 | 0.20  | 0.14 | 0.22          | 0.09  | 0.06  | -0.02 |
| 6. Direct-indirect              | 0.53 | 0.21  | 0.09 | 0.15          | 0.07  | 0.02  | 0.26  |
| 7. Complete-incomplete          | 0.52 | 0.27  | 0.22 | 0.15          | 0.18  | 0.11  | 0.06  |
| 8. Informative-misleading       | 0.45 | 0.25  | 0.22 | 0.25          | 0.16  | 0.14  | 0.24  |
| 9. General-specific             | 0.44 | 0.01  | 0.03 | 0.00          | 0.00  | 0.20  | -0.01 |
| 2. Evaluative                   |      |       |      |               |       |       |       |
| 10. Good-bad                    | 0.17 | 0.80  | 0.12 | 0.14          | 0.16  | 0.15  | 0.15  |
| 11. Beneficial-adverse          | 0.15 | 0.78  | 0.22 | 0.23          | 0.17  | 0.11  | 0.08  |
| 12. Safe-risky                  | 0.23 | 0.55  | 0.17 | -0.01         | 0.15  | 0.00  | 0.12  |
| 13. Strong-weak                 | 0.28 | 0.50  | 0.22 | 0.26          | 0.13  | 0.01  | 0.14  |
| 14. Available-unavailable       | 0.25 | 0.44  | 0.07 | 0.26          | 0.09  | 0.07  | 0.09  |
| 3. Control                      |      |       |      |               |       |       |       |
| 15. Planned-unplanned           | 0.15 | 0.23  | 0.69 | 0.07          | 0.20  | 0.07  | 0.09  |
| 16. Expected-unexpected         | 0.14 | 0.19  | 0.67 | 0.15          | 0.25  | 0.10  | 0.35  |
| 17. Controllable-uncontrollable | 0.25 | 0.24  | 0.65 | 0.08          | 0.11  | 0.16  | -0.08 |
| 4. Activity                     |      |       |      |               |       |       |       |
| 18. Active-passive              | 0.25 | 0.24  | 0.12 | 0.72          | 0.10  | 0.12  | 0.14  |
| 19. Dynamic-static              | 0.19 | 0.21  | 0.14 | 0.57          | -0.08 | 0.20  | 0.16  |
| 5. Time                         |      |       |      |               |       |       |       |
| 20. Long term-short term        | 0.02 | 0.19  | 0.17 | 0.00          | 0.79  | 0.09  | 0.00  |
| 21. Permanent-temporary         | 0.02 | 0.15  | 0.10 | 0.00          | 0.54  | -0.25 | 0.05  |
| 22. Cumulative-non-cumulative   | 0.03 | 0.17  | 0.12 | 0.05          | 0.36  | 0.03  | 0.07  |
| 6. Stability                    |      |       |      |               |       |       |       |
| 23. Flexible-inflexible         | 0.08 | 0.22  | 0.14 | 0.05          | 0.09  | 0.93  | 0.06  |
| 24. Variable-constant           | 0.00 | 0.02  | 0.06 | 0.12          | -0.08 | 0.56  | 0.03  |
| 7. Necessity                    |      |       |      |               |       |       |       |
| 25. Necessary-unnecessary       | 0.22 | 0.36  | 0.21 | 0.15          | 0.06  | 0.11  | 0.64  |
| 26. Required-discretionary      | 0.17 | 0.25  | 0.10 | 0.26          | 0.18  | -0.03 | 0.53  |
| 8. Unassigned                   |      |       |      |               |       |       |       |
| 27. Committed-uncommitted       | 0.29 | -0.09 | 0.27 | 0.08          | 0.15  | -0.11 | 0.19  |
| 28. Current-past                | 0.28 | 0.14  | 0.16 | 0.14          | -0.22 | 0.04  | 0.21  |
| 29. Productive-unproductive     | 0.23 | 0.45  | 0.05 | 0.43          | 0.10  | -0.02 | 0.16  |
| 30. Immediate-remote            | 0.39 | 0.15  | 0.18 | 0.29          | -0.04 | 0.02  | 0.24  |
| 31. Certain-uncertain           | 0.38 | 0.05  | 0.42 | 0.08          | 0.34  | -0.10 | 0.19  |
| 32. Common-uncommon             | 0.19 | 0.25  | 0.46 | 0.19          | 0.10  | 0.18  | 0.33  |
| 33. Costly-expensive            | 0.20 | -0.11 | 0.15 | 0.07          | 0.25  | 0.16  | 0.20  |

would be approximately: 4.1, 3.1, 2.1, 1.5, 1.4, 1.2, 1.1. If a scree test (see Kim & Mueller, 1978) were applied to Haried's results, the outcome would be that possible only three factors would be seen as suitable for rotation (i.e. stable and suitable for interpretation).

Clearly, Haried (1972) made a significant con-

tribution with the development of 33 scales potentially suitable for use in accounting research. One is, however, left with some concern over the factor analytic stage of that study; in particular, the determination of the number of factors, and the selection of semantic differentials that are used to describe the nature of factors.

TABLE 2. Haried (1972) factors and associated semantic differentials, where a 0.5 factor loading criterion is applied

|                                                                                                                                                                         |                                                                              |                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 1. Objectivity<br>Exact—estimated<br>Measurable—unmeasurable<br>Tangible—intangible<br>Real—imaginary<br>Objective—subjective<br>Direct—indirect<br>Complete—incomplete | 2. Evaluative<br>Good—bad<br>Beneficial—adverse<br>Safe—risky<br>Strong—weak | 3. Control<br>Planned—unplanned<br>Expected—unexpected<br>Controllable—uncontrollable |
| 4. Activity<br>Active—passive<br>Dynamic—static                                                                                                                         | 5. Time<br>Long term—short term<br>Permanent—temporary                       | 6. Stability<br>Flexible—inflexible<br>Variable—constant                              |
| 7. Necessity<br>Necessary—unnecessary<br>Required—discretionary                                                                                                         |                                                                              |                                                                                       |

### HARIED'S (1973) STUDY

Haried (1973) was based on a subset of 15 scales from the previous 33. The selection criterion is not specified or easily determined. The 15 selected were not the scales which loaded most heavily on the seven factors or dimensions. Nevertheless, these scales, said to represent Haried's previously determined seven independent dimensions, formed the basis of the test instrument. Haried's (1973) hypotheses were that:

- (1) certain accounting terms could elicit different measures from different groups, specifically preparers and users of accounting communications, and
- (2) certain other pairs of concepts which could be regarded as synonyms, would have similar meanings to each other.

The first of the two hypotheses was, in many ways, the more important. For the first time some empirically based quantification would be given to the extent of shared meanings in the accounting communication process.

#### *Haried's (1973) concepts.*

Whilst the concept selection process in Haried (1972) had been of less concern, the selection of concepts in this stage of Haried's research was important. The selection criteria were not clearly specified in Haried (1970, 1973), but the concepts were said (Haried,

1973, p.119) to be "balanced across the major sections generally presented in financial reports". In all, 16 concepts were tested in relation to the two hypotheses:

Hypothesis (1) concepts: cash flow; depreciation; extraordinary item; generally accepted accounting principles; goodwill; reserve for self-insurance.

Hypothesis (2) concepts (in pairs of apparent synonyms): accumulated depreciation and reserve for depreciation; capital in excess of stated value of stock and capital surplus; estimated expense items and provision for expense item; estimated uncollectable receivables, and provisions for doubtful accounts receivable; retained earnings and earned surplus.

These 16 concepts were randomly split by Haried into two sets, each containing eight items. Each set contained a mixture of Hypothesis 1 and 2 concepts. Haried considered this method of reducing subject task load to necessary because "it appears doubtful that professional persons would be willing to voluntarily contribute more time than [had been determined in pre-testing] . . . to an unsolicited questionnaire" (Haried, 1973, p.129).

#### *Subjects: preparers and users of accounting data*

Three groups of "sophisticated" respondents were chosen: accountants (drawn from the membership list of the Illinois Society of Cer-

tified Public Accountants), financial analysts (Financial Analysts' Federation), and lawyers (Cook County Attorneys). Table 9 of Haried (1973, p.131) shows that the number of usable responses from these three groups were respectively; 130, 61 and 69, a total of 260 "half" responses or 130 complete sets of responses. This gives an average response ratio of 18.3% over the three groups.

In addition to these mailed questionnaire responses it appears that Haried conducted two laboratory or field experiments, one for members of an investment club, and one for non-business students. Both these groups were said to represent "unsophisticated" subjects.

#### *Haried's responses*

In all, 190 complete sets of responses were obtained, approximately 130 from the sophisticated groups (with about half being from CPAs, the other half equally divided between financial analysts and lawyers) and 60 from the unsophisticated groups (with slightly more students than investment club members).

#### *Results*

Based on the previously determined (Haried, 1972) seven dimensional cognitive structure, Haried (1973, p.133-5) found that "No important differences in overall meaning between preparers and users could be inferred for the five [in fact it was six] terms relating to the first generalized hypothesis. However, important differences on specific dimensions of meaning could be inferred for four of the terms". Indeed, of the 64 "possible differences" measured by Haried (1973, p.134) only three were, using his measurement techniques, important or significant.

With respect to the second hypothesis, certain between-concept differences were found. In particular, an overall difference was found for the pair "capital in excess of stated value" and "capital surplus".

Thus, whilst between-concept differences

were, apparently, measurable with the semantic differential technique, there were few measurable between-group differences.

#### RE-ANALYSIS OF HARIED'S DATA

It was Haried's (1973) work that dealt with between-group differences in meaning which was subjected to detailed re-analysis.<sup>2</sup>

Re-analysis of Haried's (1973) data suggests that his conclusions about connotative meaning are not well founded. Haried (1973) based his measurement of meaning on his seven dimensions. This means that, for there to be an important overall difference in meaning, substantial differences on at least some of these seven dimensions would be necessary. Factor analysis (principal components analysis with varimax rotation) of Haried's (1973) data casts doubt on the appropriateness of Haried's seven dimensional structure. In particular, the re-analysis shows:

- (1) a lack of consistent cognitive structure across all five groups, and
- (2) the presence of only three 'stable' factors for most of those groups.

#### *Examination of the cognitive structure*

Factor analysis (using SPSS, Nie *et al.*, 1975) of Haried's (1973) data showed there were only four factors with given values greater than one:

| Factor | Eigen value |
|--------|-------------|
| 1      | 3.32        |
| 2      | 2.03        |
| 3      | 1.58        |
| 4      | 1.24        |
| 5      | 0.95        |

The stability and relevance of this structure can be tested in a number of ways. As noted above, a simple but elegant method is the scree test (Kim & Mueller, 1978). Such a test looks at the rate of change in the decline of the eigen

<sup>2</sup> A preliminary re-analysis of the 1972 data bank was also undertaken. Basic results such as number of factors and their eigen values could not be replicated. The reason for this is unknown and not likely to be determinable.

values, the cut-off point is said to occur where the rate of change in the eigen values decreases sharply. In this case, a scree test would suggest that no more than three factors are not "scree" (rubble or residual). A more rigorous method used to test factor stability is factor comparability. Factor comparability was originally designed to test between-group comparability (Nunnally, 1978; Everett & Entrekina, 1980), however, it can also be used to test within-group stability. A within-group test could be based on comparing two randomly selected sub-groups of the original group of subjects. Nunnally (1978, p.433) described the means by which one can compare the two (or more) factor structures of two (or more) groups:

To obtain factor scores in one analysis, a set of weights must be applied to the variables. The set of weights required in one analysis can be applied to the scores of the different people in the different analysis. In each analysis, this would then provide two sets of factor scores — the weight for one obtained from the analysis of a different group of subjects. The correlation between these two sets of factor scores could be used to judge the comparability of factors in the analysis of the same variable as different groups of subjects.

It is this method of factor comparability, previously used in psychology (Everett & Entrekina, 1980) which has been employed here. A random split-halves test of comparability (comparing the factor structure of one half of the total population with the other) shows a lack of comparability (Pearson correlation coefficients for the four factors being 0.7305, 0.9013, 0.5744 and 0.8168), particularly for the first and third factors. A common cut-off level for factor comparability is a correlation of approaching 0.9, that is where the shared variance is about 80% or more.

#### Comparable factor structure

Re-specification of the factor structure into a

three factor solution showed comparability with correlations of 0.9688, 0.9132 and 0.9337 for the three factors respectively. This implies that the relevant cognitive structure within accounting has three (not seven) dimensions.

The nature of that stable structure can be found from the final factor matrix. This matrix, after varimax rotation, is shown in Table 3.

TABLE 3. Factor matrix (varimax rotation) for all groups in Harled (1973)

| Scale                       | Factor 1 | 2     | 3     |
|-----------------------------|----------|-------|-------|
| Necessary—unnecessary       | 0.195    | 0.611 | 0.136 |
| Long term—short term        | 0.485    | 0.020 | 0.401 |
| Exact—estimated             | 0.013    | 0.528 | 0.229 |
| Variable—constant           | 0.179    | 0.151 | 0.229 |
| Beneficial—adverse          | 0.674    | 0.306 | 0.159 |
| Planned—unplanned           | 0.704    | 0.003 | 0.069 |
| Dynamic—static              | 0.114    | 0.235 | 0.620 |
| Required—discretionary      | 0.005    | 0.655 | 0.095 |
| Permanent—temporary         | 0.461    | 0.174 | 0.522 |
| Measurable—unmeasurable     | 0.087    | 0.582 | 0.032 |
| Flexible—inflexible         | 0.310    | 0.271 | 0.599 |
| Good—bad                    | 0.684    | 0.354 | 0.146 |
| Controllable—uncontrollable | 0.582    | 0.020 | 0.057 |
| Active—passive              | 0.280    | 0.355 | 0.495 |
| Real—imaginary              | 0.126    | 0.673 | 0.159 |

Those scales which load heavily (greater than 0.5 rounded to two decimal places) on the three stable factors are shown in Fig. 2.

There is always some degree of subjectivity in the labelling of factors. At least in some respects, the three factors have characteristics consistent with the three "standard" factors identified by Osgood *et al.* (1957). Of the three, the first factor appears least like the equivalent factor of Osgood *et al.* (1957). While this factor does contain some general 'evaluative' characteristics (good—bad, beneficial—adverse); it has certain other semantic scales (controllable—uncontrollable, planned—unplanned) that are less clearly

Fig. 2.

| Factor scales | 1                           | 2                       | 3                   |
|---------------|-----------------------------|-------------------------|---------------------|
|               | Beneficial—adverse          | Real—imaginary          | Dynamic—static      |
|               | Planned—unplanned           | Necessary—unnecessary   | Permanent—temporary |
|               | Good—bad                    | Exact—estimated         | Flexible—inflexible |
|               | Controllable—uncontrollable | Required—discretionary  | Active—passive      |
|               |                             | Measurable—unmeasurable |                     |

"evaluative". In part, this is probably a reflection of the domain of interest. It may be that in accounting "controllable" and "planned" are evaluations consistent with "good" and "beneficial". This linkage between general notions of evaluation and those of "managability" (controllable, planned and the like) may be uniquely accounting oriented, and not relevant to more general domains investigated by Osgood *et al.* (1957) and others. The second factor quite clearly involves measures of "potency" or substantiveness (real-imaginary; exact-estimated; required-discretionary; measurable-unmeasurable), whilst the third factor clearly relates to "activity" (dynamic-static, active-passive, flexible-inflexible). Keeping in mind the possibly unique characteristics found in factor 1, the three factors found to be relevant in accounting were labelled in a manner consistent with Osgood *et al.* (1957): evaluative, potency, activity.

Whilst this structure may be stable for the whole population, such a test says nothing about the relevance or applicability of the structure to individual groups. Table 4 shows the correlations resulting from a factor comparability test between the total population solution, and those of the individual groups.

Whilst high comparability can be observed for the three "professional" groups: accountants,

financial analyst and lawyers, and a reasonably compatible structure can be seen for the non-business administration students, the population structure is not compatible to the members of the investment club. This lack of comparability is a sign that this "general" cognitive structure is not applicable for that particular group. The investment club members had some different solution, relevant to that group.

#### *Within-group cognitive structure*

Each of the groups was factor analysed individually. Given the results in Table 4, the results for the Investment Club group were of particular interest. The heavily loaded scales from the factor matrix of that group (after varimax rotation) are shown in Fig. 3.

This structure is difficult to label. Each of the three factors, seems to have different characteristics. It is of interest to note that, even though the factor matrix is not comparable with the population of subjects, it is internally stable (i.e. internally comparable). A split halves test of comparability within the investment club groups resulted in correlation coefficients of 0.9483, 0.9067 and 0.9703.

Individual group factor analyses were executed for each of the other groups. Internal comparability was observed in three of those four

Fig. 3. Heavily loading scales from the factor matrix of the Investment Club Group.

|                        |                    |                         |
|------------------------|--------------------|-------------------------|
| 1                      | 2                  | 3                       |
| Necessary—unnecessary  | Beneficial—adverse | Exact—estimated         |
| Long term—short term   | Dynamic—static     | Variable—constant       |
| Planned—unplanned      | Active—passive     | Measurable—unmeasurable |
| Required—discretionary | Real—imaginary     |                         |
| Permanent—temporary    |                    |                         |
| Good—bad               |                    |                         |

TABLE 4. Haried (1973) factor structure comparability — individual groups' correlation coefficients

| Groups                  | Population factors |        |        |
|-------------------------|--------------------|--------|--------|
|                         | 1                  | 2      | 3      |
| Accountants             | 0.9784             | 0.9948 | 0.9421 |
| Financial analysts      | 0.9558             | 0.9905 | 0.9660 |
| Lawyers                 | 0.9724             | 0.9862 | 0.9868 |
| Investment club members | 0.7123             | 0.7843 | 0.5885 |
| Students                | 0.8792             | 0.8899 | 0.8677 |

groups (see Fig. 4).

The students showed instability even when two and one factor solutions were specified in the factor analysis. Thus, whilst being reasonably comparable to the general three factor solution, that solution was not internally stable. Perhaps this is a product of the use of a heterogeneous group of student subjects

Therefore, because of either incomparability with the population factor matrix or internal factor structure instability, the investment club and student groups were deleted from further analysis. This left the three "professional" (i.e. Haried's "sophisticated") groups. Thus, even at this stage, it is possible to identify basic differences between the "professional" subjects and the non-professional ones.

#### *Between-group comparability for the three "professional" concepts*

Re-specification of the factor analytic model for these three groups produced a varimax rotated solution very similar (although not absolutely identical) to that of the population described above. The factor comparability remained high both between the three individual groups and the population (of the three groups) and between each of the individual groups. That

is to say, the three groups (accountants, financial analysts, and lawyers) each had an underlying cognitive structure which was very similar to each other. The correlation coefficients for each of the comparisons are reported in Fig. 5.

It is interesting to note that there is a higher correlation (albeit slight) between the two user groups (financial analysts and lawyers) than between each of those groups and the preparer group (accountants). Given this high level of comparability, this structure was considered as relevant, and appropriate for the measurement of the meaning of the various accounting concepts selected for the inquiry.

#### *Relative position of concepts on three shared dimensions*

The mean score of the subjects in their three respective groups was determined for each of the 16 concepts on each of the three factors. These mean scores of the factors are referred to below as their 'placements' on the factors or dimensions. This is because they represent the direction and extent of the groups' positioning of concepts on the factors. These are reported for the accountants (Table 5), financial analysts (Table 6) and lawyers (Table 7) separately.

As can be seen from Table 5, many of the

Fig. 4. Internal group factor analyses.

|                    | Pearson correlation coefficients |        |        |
|--------------------|----------------------------------|--------|--------|
| Accountants        | 0.9786                           | 0.9462 | 0.9917 |
| Financial analysts | 0.8696                           | 0.9632 | 0.8652 |
| Lawyers            | 0.9332                           | 0.9411 | 0.8634 |
| Students           | 0.7935                           | 0.6482 | 0.6552 |

Fig. 5. Correlation coefficients for between-group comparability.

|                    | Population factors         |        |        |
|--------------------|----------------------------|--------|--------|
|                    | 1                          | 2      | 3      |
| Accountants        | 0.9936                     | 0.9798 | 0.9789 |
| Financial analysts | 0.9980                     | 0.9496 | 0.9471 |
| Lawyers            | 0.9604                     | 0.9948 | 0.9623 |
|                    | Accountants factors        |        |        |
|                    | 1                          | 2      | 3      |
| Financial analysts | 0.9909                     | 0.8788 | 0.8634 |
| Lawyers            | 0.8981                     | 0.9829 | 0.8928 |
|                    | Financial analysts factors |        |        |
|                    | 1                          | 2      | 3      |
| Lawyers            | 0.9843                     | 0.9932 | 0.9807 |

TABLE 5. Placement of concepts on three shared dimensions by accountants

|                                                   | Factor    |      |           |      |           |      |
|---------------------------------------------------|-----------|------|-----------|------|-----------|------|
|                                                   | 1<br>Mean | S.E. | 2<br>Mean | S.E. | 3<br>Mean | S.E. |
| 1. Reserve for depreciation*                      | —         | —    | —         | —    | —         | —    |
| 2. Retained earnings                              | 71        | 9    | 25        | 10   | -27       | 10   |
| 3. Provision for expenses item                    | 17        | 10   | -49       | 8    | 64        | 9    |
| 4. Cash flow                                      | 27        | 11   | 16        | 9    | 68        | 9    |
| 5. Extraordinary item                             | 73        | 9    | -155      | 11   | 14        | 9    |
| 6. Earned surplus*                                | —         | —    | —         | —    | —         | —    |
| 7. Accumulated depreciation                       | 1         | 8    | 6         | 11   | -44       | 9    |
| 8. Estimated expense item                         | 15        | 9    | -30       | 9    | 80        | 9    |
| 9. Reserve for doubtful<br>accounts receivable*   | —         | —    | —         | —    | —         | —    |
| 10. Depreciation                                  | 25        | 9    | 27        | 10   | -36       | 10   |
| 11. Capital surplus*                              | —         | —    | —         | —    | —         | —    |
| 12. Goodwill                                      | -102      | 15   | -56       | 9    | -59       | 15   |
| 13. Generally accepted<br>accounting principles   | 52        | 8    | 79        | 8    | -17       | 10   |
| 14. Reserve for self-insurance                    | -110      | 15   | 44        | 10   | -6        | 11   |
| 15. Estimated uncollectable<br>receivables        | 8         | 9    | -66       | 13   | 64        | 9    |
| 16. Capital in excess of<br>stated value of stock | 39        | 11   | -4        | 11   | -167      | 13   |

\* These concepts were not included in the instruments directed at the members of the accountants' group.

accountants' meanings are intuitively appealing. For example "Retained Earnings" was seen as positive on the evaluative and potency dimensions ("good" and "substantive") but negative on the activity dimension. "Cash Flow" was seen as good, substantive and active. The differential placement of these two concepts is consistent with expectations, retained earnings is a stock (inactive), whilst cash flow is a flow (active).

In general, there were many concepts that were seen similarly by both accountants and financial analysts. For example, financial analysts (Table 6) also saw "Cash Flow" as good, substantive and active. However, they also saw some concepts differently to the accountants. For example, they saw "Estimated Expenses" as negative on the evaluative dimension, accountants saw it as positive.

Lawyers (Table 7) did not see all the concepts in a manner highly consistent with either of the other two groups. For example, "Cash Flow" was close to neutral (neither positive nor negative)

on the evaluative dimension. "Generally Accepted Accounting Principles" was not as good as accountants and financial analysts saw it, and lawyers saw "Accumulated Depreciation" as negative on the evaluative dimension. Between-group differences can be observed from Table 10.

#### *Significance of between-group differences — Haried's hypothesis 1*

An overall test of differences of the meanings for the six concepts relating to Haried's first hypothesis can be achieved with a multivariate analysis of variance. In this study, the Statistical Package for Social Sciences (Hull & Nie, 1981) MANOVA routine was used so as to provide a comprehensive measure over all three factors.

The results from this showed that, as might be expected, between-concept differences were highly significant ( $F = 78.10$ , significance  $< 0.001$ ). In addition, between-group differences were also highly significant ( $F = 3.72$ , signifi-



TABLE 6. Placement of concepts on three shared dimensions by financial analysts

| Concept                                           | Factor    |      |           |      |           |      |
|---------------------------------------------------|-----------|------|-----------|------|-----------|------|
|                                                   | 1<br>Mean | S.E. | 2<br>Mean | S.E. | 3<br>Mean | S.E. |
| 1. Reserve for depreciation                       | -7        | 17   | 58        | 14   | -17       | 14   |
| 2. Retained earnings                              | 46        | 11   | 53        | 13   | 28        | 11   |
| 3. Provision for expenses item                    | 11        | 15   | -20       | 16   | 47        | 14   |
| 4. Cash flow                                      | 47        | 12   | 41        | 14   | 41        | 13   |
| 5. Extraordinary item                             | 29        | 15   | -119      | 15   | 45        | 18   |
| 6. Earned surplus                                 | 41        | 14   | 46        | 13   | -8        | 14   |
| 7. Accumulated depreciation                       | 4         | 11   | 58        | 16   | -27       | 13   |
| 8. Estimated expense item                         | -17       | 14   | -47       | 13   | 70        | 12   |
| 9. Reserve for doubtful<br>accounts receivable    | 0         | 13   | 11        | 12   | 47        | 12   |
| 10. Depreciation                                  | 29        | 12   | 88        | 11   | -5        | 17   |
| 11. Capital surplus                               | 9         | 17   | 12        | 15   | -77       | 19   |
| 12. Goodwill                                      | -153      | 22   | -47       | 12   | -65       | 19   |
| 13. Generally accepted<br>accounting principles   | 29        | 18   | 71        | 9    | -36       | 15   |
| 14. Reserve for self-insurance                    | -120      | 18   | 61        | 15   | -9        | 11   |
| 15. Estimated uncollectable<br>receivables        | 26        | 13   | -57       | 24   | 82        | 15   |
| 16. Capital in excess of<br>stated value of stock | 7         | 21   | -4        | 16   | -94       | 21   |

TABLE 7. Placement of concepts on three shared dimensions by lawyers

| Concept                                           | Factor    |      |           |      |           |      |
|---------------------------------------------------|-----------|------|-----------|------|-----------|------|
|                                                   | 1<br>Mean | S.E. | 2<br>Mean | S.E. | 3<br>Mean | S.E. |
| 1. Reserve for depreciation                       | -42       | 14   | 58        | 15   | -18       | 16   |
| 2. Retained earnings                              | 8         | 13   | 46        | 14   | 12        | 12   |
| 3. Provision for expenses item                    | 0         | 11   | -1        | 13   | 55        | 13   |
| 4. Cash flow                                      | 4         | 15   | 10        | 14   | 75        | 10   |
| 5. Extraordinary item                             | 47        | 15   | -147      | 16   | 38        | 14   |
| 6. Earned surplus                                 | 47        | 14   | 2         | 14   | 38        | 14   |
| 7. Accumulated depreciation                       | -19       | 17   | 34        | 16   | -47       | 15   |
| 8. Estimated expense item                         | -68       | 16   | -41       | 12   | 86        | 14   |
| 9. Reserve for doubtful<br>accounts receivable    | -28       | 16   | -19       | 15   | 26        | 13   |
| 10. Depreciation                                  | 24        | 13   | 40        | 15   | -26       | 12   |
| 11. Capital surplus                               | 33        | 12   | 29        | 14   | -45       | 13   |
| 12. Goodwill                                      | -92       | 19   | 39        | 17   | -15       | 16   |
| 13. Generally accepted<br>accounting principles   | 7         | 18   | 42        | 13   | -22       | 14   |
| 14. Reserve for self-insurance                    | -51       | 19   | 74        | 15   | -9        | 12   |
| 15. Estimated uncollectable<br>receivables        | 30        | 16   | -82       | 17   | 44        | 15   |
| 16. Capital in excess of<br>stated value of stock | 15        | 15   | -31       | 13   | -51       | 15   |

cance  $< 0.002$ ). From this one can conclude that the semantic differentials measurement of connotative meaning is sensitive and capable of the measurement of overall between-concept differences in accounting.

One can also conclude that when measurements are taken on the basis of an applicable cognitive structure, and without the clouding caused by the inclusion of unstable or non-compatible group responses, significant between-group differences in meaning can be measured by the semantic differential.

These conclusions do not, however, tell us anything about the nature and extent of these between-group differences. The need to examine, on a more detailed level, the between-group and between-concept effects also comes from the presence of a significant interaction between the group and concept effects ( $F = 2.86$ , significance  $< 0.001$ ). A significant interaction of this kind can make it difficult or impossible to determine the cause of differences (see Blalock, 1979, amongst others). In this case, both the concept and group effect was highly significant, however the presence of a significant interaction will mean that the differences are not consistent over all factors, all concepts, or all groups. That is, a highly significant between-group difference might exist for certain of the concepts but not for others, or a significant between-concept difference might exist for one group but not for others.

Even when considered on a factor by factor basis, the presence of a significant interaction remains for two of the three factors. This is shown in Table 8.

In the case of the third factor, "Activity", there is no significant interaction. Indeed there exists no significant between-group difference on this factor. Thus, in relation to the activity factor, one cannot distinguish between groups.

One way of overcoming the problems raised by the significant interaction between the concept and group effects is to consider the significance of the group effect on a concept-by-concept basis. Table 9 shows the between-group effect on each of the dimensions of meaning for each of the six concepts.

TABLE 8. Haried's hypothesis 1 — group and concept effects on individual factors

| Factor | Source      | D.F. | F      | Significance |
|--------|-------------|------|--------|--------------|
| 1      | Group       | 2    | 2.20   | 0.112        |
|        | Concept     | 5    | 78.73  | 0.001        |
|        | Interaction | 10   | 2.93   | 0.001        |
| 2      | Group       | 2    | 6.50   | 0.002        |
|        | Concept     | 5    | 129.66 | 0.001        |
|        | Interaction | 10   | 5.08   | 0.001        |
| 3      | Group       | 2    | 1.68   | 0.187        |
|        | Concept     | 5    | 21.73  | 0.001        |
|        | Interaction | 10   | 1.44   | 0.156        |

TABLE 9. Haried's hypothesis 1 — group effect on individual factors for each concept

| Concept                                  | Factor | D.F. | F     | Significance |
|------------------------------------------|--------|------|-------|--------------|
| Cash flow                                | 1      | 2    | 2.10  | 0.127        |
|                                          | 2      | 2    | 1.42  | 0.246        |
|                                          | 3      | 2    | 2.13  | 0.124        |
| Depreciation                             | 1      | 2    | 0.40  | 0.961        |
|                                          | 2      | 2    | 6.03  | 0.003        |
|                                          | 3      | 2    | 1.50  | 0.227        |
| Extraordinary item                       | 1      | 2    | 3.62  | 0.030        |
|                                          | 2      | 2    | 1.77  | 0.175        |
|                                          | 3      | 2    | 1.91  | 0.153        |
| Generally accepted accounting principles | 1      | 2    | 3.09  | 0.049        |
|                                          | 2      | 2    | 3.66  | 0.029        |
|                                          | 3      | 2    | 0.56  | 0.573        |
| Goodwill                                 | 1      | 2    | 2.58  | 0.079        |
|                                          | 2      | 2    | 17.06 | 0.001        |
|                                          | 3      | 2    | 2.27  | 0.107        |
| Reserve for self-insurance               | 1      | 2    | 4.03  | 0.020        |
|                                          | 2      | 2    | 1.63  | 0.200        |
|                                          | 3      | 2    | 0.02  | 0.978        |

The lack of between-group differences for the activity dimension is clearly shown in Table 9. Significant differences were found on the evaluative and potency factors with significant differences being found on *both* of these factors for the concept "Generally Accepted Accounting Principles". Haried (1973) reported no between-group difference for this concept.

One can conclude that the instrument can indeed measure important differences in meaning,

but the exact source of the between-group differences is still unknown. It could be caused by differences between the two financial expert groups, accountants and analysts; or between the two user groups, lawyers and analysts; or between the accountants and the lawyers.

Table 10 shows the between-group differences for each of the concepts for the following pairings: accountants vs financial analysts; accountants vs lawyers; financial analysts vs lawyers. Interestingly, there were more significant differences between the two user groups, financial analysts and lawyers, than either of the other pairs, both of which were based on a producer/user comparison. Two significant differences existed between accountants and analysts. Analysts saw "Depreciation" as much more potent, and "Extraordinary Item" much less "good" than did accountants. Four significant differences existed between accountants and lawyers, including two relating to "Generally Accepted Accounting Principles." The differences between analysts and lawyers were numerous. They differed on every factor for "Goodwill",

with analysts seeing that concept as lower on all three dimensions. The analysts saw "Cash Flow" as higher, and "Reserve for Self-Insurance" as lower on the evaluative dimension, and saw "Depreciation" as more potent, and "Cash Flow" as less active than the lawyers.

The quantitative placements of the six concepts, by each of the three "professional" groups, are shown in Table 11. The direction of differences previously reported can be observed.

#### *Significance of between-concept differences — Haried's hypothesis 2*

In relation to Haried's second hypothesis which dealt with possible synonyms, few between-concept differences emerged for the two financially trained groups. However, several such differences were found for the lawyer group, and these can be seen in Table 12. As noted above in Table 5, the accountants were only tested by Haried for one of the synonym pairs.

One could speculate that many of the differences arise because lawyers are unlikely to have

TABLE 10. Haried's hypothesis 1 — group effect on group pairing basis for each concept on all factors

| Concept                                 | Factor | Accountants vs<br>F. analysts |       | F. analysts<br>vs lawyers |       | Accountants<br>vs lawyers |       |
|-----------------------------------------|--------|-------------------------------|-------|---------------------------|-------|---------------------------|-------|
|                                         |        | <i>F</i>                      | Sign  | <i>F</i>                  | Sign  | <i>F</i>                  | Sign  |
| Cash flow                               | 1      | 1.17                          | 0.282 | 4.85                      | 0.031 | 1.53                      | 0.220 |
|                                         | 2      | 2.07                          | 0.154 | 2.40                      | 0.126 | 0.16                      | 0.690 |
|                                         | 3      | 2.73                          | 0.102 | 4.34                      | 0.042 | 0.23                      | 0.634 |
| Depreciation                            | 1      | 0.05                          | 0.820 | 0.07                      | 0.788 | 0.01                      | 0.930 |
|                                         | 2      | 13.37                         | 0.001 | 6.09                      | 0.016 | 0.47                      | 0.496 |
|                                         | 3      | 2.75                          | 0.101 | 1.02                      | 0.317 | 0.44                      | 0.510 |
| Extraordinary<br>item                   | 1      | 7.05                          | 0.009 | 0.73                      | 0.396 | 2.56                      | 0.113 |
|                                         | 2      | 3.71                          | 0.057 | 0.21                      | 0.211 | 0.17                      | 0.683 |
|                                         | 3      | 3.03                          | 0.085 | 0.08                      | 0.776 | 2.37                      | 0.127 |
| Generally<br>accepted<br>a/c principles | 1      | 1.86                          | 0.176 | 0.71                      | 0.402 | 6.51                      | 0.012 |
|                                         | 2      | 0.40                          | 0.528 | 2.85                      | 0.096 | 6.48                      | 0.012 |
|                                         | 3      | 1.13                          | 0.290 | 0.46                      | 0.500 | 0.50                      | 0.772 |
| Goodwill                                | 1      | 3.68                          | 0.058 | 4.51                      | 0.037 | 0.18                      | 0.673 |
|                                         | 2      | 0.31                          | 0.582 | 12.46                     | 0.001 | 29.43                     | 0.001 |
|                                         | 3      | 0.06                          | 0.807 | 4.31                      | 0.042 | 3.47                      | 0.065 |
| Reserve<br>for self-<br>insurance       | 1      | 0.16                          | 0.694 | 6.88                      | 0.011 | 5.91                      | 0.017 |
|                                         | 2      | 1.05                          | 0.307 | 0.33                      | 0.569 | 3.14                      | 0.079 |
|                                         | 3      | 0.02                          | 0.884 | 0.00                      | 0.976 | 0.03                      | 0.858 |

TABLE 11. Placement of Haried's Hypothesis 1 — concepts on all factors by three professional groups (significant differences are highlighted)

| Concepts<br>No. Name                        | 1. Evaluative |      |     | Factor<br>2. Potency |      |      | 3. Activity |      |     |
|---------------------------------------------|---------------|------|-----|----------------------|------|------|-------------|------|-----|
|                                             | Acct          | F.A. | Law | Acct                 | F.A. | Law  | Acct        | F.A. | Law |
| 4 Cash flow                                 | 27            | 47   | 4   | 16                   | 41   | 10   | 68          | 41   | 75  |
| 10 Depreciation                             | 25            | 29   | 24  | 27                   | 88   | 40   | -36         | -5   | -26 |
| 5 Extraordinary item                        | 73            | 29   | 47  | -155                 | -119 | -147 | 14          | 45   | 38  |
| 13 Generally accepted accounting principles | 52            | 29   | 7   | 79                   | 71   | 42   | -17         | -36  | -22 |
| 12 Goodwill                                 | -102          | -153 | -92 | -56                  | -47  | 39   | -59         | -65  | -15 |
| 14 Reserve for self-insurance               | -110          | -120 | -51 | 44                   | 61   | 74   | -6          | -9   | -9  |

Significant differences ----- between accountants and analysts,  
 (at 0.05 level) ..... between analysts and lawyers,  
 \_\_\_\_\_ between accountants and lawyers.

TABLE 12. Haried's hypothesis 2 — differences between pairs of concepts by group

| Concepts                 | Factor | Accountants |       | Financial<br>analysts |       | Lawyers |       |
|--------------------------|--------|-------------|-------|-----------------------|-------|---------|-------|
|                          |        | F           | Sign  | F                     | Sign  | F       | Sign  |
| Reserve for depreciation | 1      | *           |       | 0.28                  | 0.600 | 1.02    | 0.316 |
| Accum. depreciation      | 2      | *           |       | 0.00                  | 0.978 | 1.17    | 0.283 |
|                          | 3      | *           |       | 0.27                  | 0.604 | 1.75    | 0.190 |
| Capital in excess        | 1      | *           |       | 0.01                  | 0.946 | 0.82    | 0.369 |
| Capital surplus          | 2      | *           |       | 0.55                  | 0.461 | 0.01    | 0.912 |
|                          | 3      | *           |       | 0.36                  | 0.552 | 0.79    | 0.779 |
| Estim. expense items     | 1      | 0.02        | 0.894 | 1.83                  | 0.181 | 12.62   | 0.001 |
| Provision for expense    | 2      | 2.27        | 0.135 | 1.79                  | 0.186 | 5.17    | 0.026 |
|                          | 3      | 1.57        | 0.213 | 1.43                  | 0.238 | 2.45    | 0.123 |
| Estim. uncollect         | 1      | *           |       | 1.98                  | 0.165 | 0.01    | 0.914 |
| Reserve for doubtful     | 2      | *           |       | 6.69                  | 0.012 | 7.80    | 0.007 |
| a/c receivable           | 3      | *           |       | 3.34                  | 0.072 | 0.89    | 0.350 |
| Retain earnings          | 1      | *           |       | 0.09                  | 0.769 | 4.38    | 0.040 |
| Earned surplus           | 2      | *           |       | 0.19                  | 0.668 | 4.83    | 0.032 |
|                          | 3      | *           |       | 4.13                  | 0.047 | 0.64    | 0.801 |

\*no measurement

as much financial training as analysts and accountants. One between-concept difference, that of "Estimated Uncollectible Receivables", and "Reserve for Doubtful Accounts Receivable" is particularly worthy of note. Both the groups that were tested for this concept pair saw the

first of these two concepts as much lower on the potency dimension than the other concept. Although not conclusive, this provides some evidence that these two concepts may not be completely synonymous. The placement on the three dimensions for each of the concepts can be

seen from Table 13.

Whilst the results of the analysis for Haried's hypothesis 1 showed that the semantic differential technique can measure between-concept (and between-group) differences, the results here show that such differences are not likely to be an artifact of the measurement instrument or the data analysis used. In many cases, and particularly where financial expert subjects were used, concepts which could be regarded as synonyms showed no between-concept differences.

### SUMMARY AND CONCLUSION

The contribution made by Haried (1972) in developing semantic differentials relevant to the accounting domain of meaning is a significant one. It is his subsequent analysis of responses that came from those scales which has been the subject of discussion here.

Haried's (1972, 1973) seven dimensional cognitive structure has been shown not to be applicable to Haried's (1973) own data. A three-dimensional structure, largely consistent in nature with that found by Osgood *et al.* (1957), was found to be applicable to Haried's (1973) responses. More detailed testing of within-group and between-group factor comparability or stability showed this three-dimensional structure to be applicable to the majority of the groups. It was found not to apply to either of the "unsophisticated" groups (the students and the investment club members).

Based on the shared three-factor structure, Haried's two hypotheses were tested and significant between-group and between-concept differences were found. The placements of the concepts, that is the quantitative measurement of meaning, on the three dimensions gave results consistent with what might be expected.

Whilst Haried's (1972 and 1973) contribution of semantic differentials relevant to

TABLE 13. Placement of Haried's hypothesis 2 — concepts of shared dimensions by three groups

| Concepts pair                              | 1. Evaluative |      |     | 2. Potency |      |     | 3. Activity |      |     |
|--------------------------------------------|---------------|------|-----|------------|------|-----|-------------|------|-----|
|                                            | Acct          | F.A. | Law | Acct       | F.A. | Law | Acct        | F.A. | Law |
| Accum. depreciation                        | 1             | 4    | -19 | 6          | 58   | 34  | -44         | -27  | -47 |
| Reserve for depreciation                   | *             | -7   | -42 | *          | 58   | 58  | *           | -17  | -18 |
| Capital in excess of stated value of stock | 39            | 7    | 15  | -4         | -4   | 31  | -167        | -94  | -51 |
| Capital surplus                            | *             | 9    | 33  | *          | 12   | 29  | *           | -77  | -45 |
| Estimated expense item                     | 15            | -17  | -68 | -30        | -47  | -41 | 80          | 70   | 86  |
| Provision for expense item                 | 17            | 11   | 0   | -49        | -20  | -1  | 64          | 47   | 55  |
| Estimated uncollectable receivables        | 8             | -26  | -30 | -66        | -57  | -82 | 64          | 82   | 44  |
| Reserve for doubtful accounts receivable   | *             | 0    | -28 | *          | 11   | -19 | *           | 47   | 26  |
| Retained earnings                          | 71            | 46   | 8   | 25         | 53   | 46  | -27         | 28   | 12  |
| Earned surplus                             | *             | 41   | 47  | *          | 46   | 2   | *           | -8   | 17  |

\*no measurement.

□ indicate significant between-concept difference at the 0.05 level.

accounting research will probably endure, his particular selection of a sub-set of these scales and his adoption of a seven-dimensional cognitive structure may well not. This study has shown that measurement of meaning is possible, and that Haried's (1972, pp.133-135) conclusion that "No important differences in overall meaning between preparer and users . . . could be inferred . . ." cannot be supported by the results of the analysis based on the three "standards" factors "evaluative", "potency" and "activity". Perhaps now the criticism which was levelled at the relevance and applicability of connotative meaning and, by inference, the semantic differential, to accounting research can be put to one side. There is much room to build on

Haried's (1972) original work. As Haried (1972, p.380) himself noted, there are "Two major problems in adapting the semantic differential to [accounting] report terminology. The first is to identify pairs of bipolar adjectives relevant to financial report terminology. The second is to identify the independent dimensions of semantic space . . ." It can be concluded that Haried (1972) succeeded in overcoming the first of these problems, and that it can now be seen that the dimensions of space are similar to those "standard" factors that were originally identified by Osgood *et al.* (1957). The way may now open for others to pursue research into the measurement of meaning in accounting.

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## BUDGETARY BIASING IN ORGANIZATIONS: THEORETICAL FRAMEWORK AND EMPIRICAL EVIDENCE\*

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### Abstract

The purpose of this study is to increase the understanding of budgetary biasing behaviour. The findings are of both a theoretical and empirical nature. The theoretical results provide a framework containing two major parts: an explanatory model of budgetary biasing at the individual level, and an organizational model for budgetary biasing. In the empirical part of the study an attempt is made to test the usability of the framework in a relatively large firm with several profit-centers. Biasing action is found to be a result of an interplay of various inter-related factors. Overall, the framework is considered to provide a valid basis for trying to understand and interpret the budgetary biasing behaviour in the firm studied.

Over the past few decades the idea of slack has been widely discussed in the theory of the firm, in organization theory and in the management accounting literature. The concept of organizational slack is of primary importance in the behavioral theory of the firm (Cyert & March, 1963; see also March & Simon, 1958; Williamson, 1963, 1964), it has been used in micro-economics, although a different terminology has sometimes been used,<sup>1</sup> and the concept also has received some attention in more general considerations of organization theory (see e.g. Thompson, 1967; Child, 1972; Galbraith, 1973; Bourgeois, 1981). In the management accounting literature the notion of slack emerged in a budgetary context in the 1950s, probably for the first time in the classic study by Argyris in 1952. Subsequent major contributions to the development of research on budgetary slack include two articles by Schiff & Lewin (1968, 1970) and the studies by Lowe & Shaw (1968) and Onsi (1973). Later studies by Östman (1977),

Kazandjis (1980), and Merchant (1985a) are also worth mentioning, especially because of their empirical findings. However, in recent years perhaps the most important studies that relate to budgetary slack are those carried out by Otley (1978, 1982, 1985). Ever since the study by Lowe & Shaw (1968) was published, the studies have often dealt with a wider phenomenon than pure budgetary slack; this wider concept is known as *budgetary bias*.

At present the fundamental problems in this area of research may be defined as follows:

- (1) The development of a direct measure of budgetary bias.
- (2) A systematic analysis of the organizational effects of budgetary biasing.
- (3) The development of an explanatory model for budgetary biasing.

The development of a proper way of measuring budgetary bias would naturally form the basis for improved analytical and quantitatively-oriented studies. The effects of budgetary bias-

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I would like to thank Professors Pekka Pihlanto and Reino Majala for their instructions and helpful comments. I am indebted to the anonymous reviewer for helping me to improve both the content and style of the article.

<sup>1</sup> See the concept of *X-efficiency* in Leibenstein (1966) and (1979).



ing are perhaps its least understood aspect. Usually budgetary biasing is regarded as dysfunctional (see e.g. Schiff & Lewin 1968, 1970), although there is good reason to claim that its functional effects may also be important (Caplan, 1971; Onsi, 1973). However, this article deals only with the last of these critical problems. The research focus of the subsequent analysis can therefore be expressed as *why, in what situations and how is budgetary bias created in organizations?* The study comprises both the development of a theoretical framework and its preliminary empirical testing, and is designed to increase understanding of budgetary biasing behaviour.

### THE BASIC CONCEPTS

In this study budgetary bias is defined as a deliberately created difference between the budgeting actor's forecast about the future ("honest budget estimate"), and his or her submitted budget figure (budget proposal). Hence the bias may arise even before a final decision about fixing the budget has been made. The term "budget" is here understood to mean a profit plan or target, i.e. we are primarily dealing with the bias at the aggregate level of profit budget for a responsibility centre.<sup>2</sup> In principle, a situation may exist where the overall budget is unbiased, whilst its components (revenues and costs) are biased in opposite directions.

The concept of budgetary bias is defined rather narrowly in this analysis. The sense of this narrowness can be better appreciated if the following three basic areas of budgetary behaviour are distinguished:<sup>3</sup>

- (1) behaviour affecting the standards
- (2) behaviour affecting the reported results
- (3) operative action affecting actual perform-

ance.

Here budgetary bias is understood as an *ex ante* concept — accordingly, biasing is a way of affecting the standards against which performance will be assessed. Essentially it is also a subjective phenomenon, because every actor (group of actors or organizational unit) usually has his or her own unique picture of the possibilities of future economic performances, which is always subject to uncertainty. In other words, in a specific budget figure (or budget proposal) there may seem to be different "amounts" of bias — even bias in different directions — depending on the viewpoint from which the situation is approached.

Otley (1985) has argued that "the realistic budget estimates" (here called the forecasts) of people may be the modes of their intuitive probability distributions, rather than, for example, the expected values. This is of importance because the probability distribution of cost and revenue tend to be skewed according to Otley; thus the expected value and the mode of the distributions are different. As a result, there is a tendency for budget forecasts to become unintentionally biased.

It should be emphasized that budgetary bias was previously defined as the difference between the actor's budget and his or her honest subjective estimate, which may be an expected value, mode, median or some other point in the distribution. Only what the actor honestly believes to be his or her realistic estimate, the forecast, is of importance here.<sup>4</sup>

The nature of a budgetary planning situation usually forces an actor to see the future in terms of point estimates. Yet, because of the existence of uncertainty, one can argue that the usual single estimate budgeting system itself produces bias in estimates.<sup>5</sup> In a situation where forecast-

<sup>2</sup> The level of aggregation may vary from contribution margin to the profit line of the budget.

<sup>3</sup> Compare Hägg *et al.* (1982); see also the "methods of distorting the information system" by Birnberg *et al.* (1983) and "biasing of actuals" in Berry *et al.* (1985).

<sup>4</sup> An actor's forecast is, because of its subjective nature, a rather theoretical concept; its accurate and objective measurement is therefore problematic.

<sup>5</sup> Of course, certain forms of probabilistic budgeting might help in this respect.

ing is difficult because of a high degree of uncertainty, it may not be possible to distinguish this unintentional bias from deliberate bias.

As a further illustration of the concept of budgetary bias, we refer to the analysis by Demski (1967) and its development by Andersson (1974). Three different errors are distinguished *ex post* in the basic difference between the budget and the actual result:

- (1) The estimation error.
- (2) Budgetary bias.
- (3) Real inefficiency and ineffectiveness.<sup>6</sup>

The first difference includes the unintentional bias discussed by Otley (1985). In the real economic terms, the third difference may be considered the most significant. However, in order to gain knowledge of it, we have to get the whole picture clear; otherwise budgetary bias may confuse control information. It should be stressed that budgetary bias, as it is defined here, remains the same *ex post* as it was *ex ante*; the other two differences may become "realized" only *ex post*.

One more remark concerning the concept of budgetary bias needs to be made: budgetary biasing behaviour is possible in all the functions and all levels of an organization. This view is in contrast to the usual, somewhat narrower approach, where the biasing behaviour is thought to be found only at the controlled levels of the organization.<sup>7</sup> This implies that the budgetary process is seen as an interplay between decision-makers, and the creation of bias in budgets is considered as one of the important aspects of this interplay.

Budgetary bias is further divided into two sub-components: *budgetary slack* (which is the traditional element of bias) and *upward-bias*.<sup>8</sup> In the following the former term is applied to the bias where the budget figure has been intentionally made easier to achieve in relation to the

forecast — the result then is literally a slack budget. An upward-bias refers to the opposite kind of biasing, to the deliberate overstatement of expected performance in the budget.

Sometimes it is difficult to distinguish *counterbiasing* from biasing. The former notion refers to the attempt by other actors to eliminate the budgetary bias (Lowe & Shaw, 1968). According to one opinion the whole problem of biasing can be "automatically" solved by counterbiasing (Cyert & March, 1963; compare Pope, 1984; Buckley, 1983). Another, perhaps more widely held view, is that counterbiasing cannot usually eliminate bias from budgets because of a number of disturbing factors and processes in organizations (see Lowe & Shaw, 1968; Berry & Otley, 1975; Kazandjis, 1980).

## THE RESEARCH APPROACH

The approach of this article is both conceptual and action-oriented, hermeneutic (see e.g. Lukka *et al.* 1984). A theoretical framework is constructed first, building on the management accounting literature, on organization theory and on related behavioural research, in order to structure present knowledge about budgetary biasing behaviour. This framework serves the role of preunderstanding in the empirical research process. The study also has a methodological flavour, as the basic explanatory scheme stems fairly directly from the philosophical thinking of Georg Henrik von Wright (see von Wright, 1971, 1976).

The theoretical part of the study focuses on a simplified, hypothetical structure of actors in an organization: two negotiating parties are assumed, one at the controlling level and the other at the controlled level. The budget is interpreted

<sup>6</sup> See Milne's (1981) discussion on the concepts of efficiency and effectiveness in the context of creating budgetary slack.

<sup>7</sup> Throughout the analysis a hypothetical two-level hierarchy including the controlling unit (principal) and the controlled unit (agent, subordinate, budgetee) is being assumed. Although the terminology used may seem to be rather impersonal — for the reason of generality — it is the actors in organizations we usually refer to.

<sup>8</sup> Compare positive and negative slack in Otley (1985).

as a contract between the parties that concerns a future period which involves uncertainty.<sup>9</sup> The actors are assumed to be both restrictively rational "administrative persons" and irrational "political persons".<sup>10</sup> Hence, perfect rationality of the actors is not assumed from the organizational point of view; the actors are, however, assumed to be intelligent from their own subjective perspective (compare Cooper *et al.*, 1981). This also fits in with our organizational assumptions which mainly follow the coalition theory viewpoint (Cyert & March, 1963).

The action-oriented approach,<sup>11</sup> although present in the conceptual phase of the study, is emphasized in the empirical phase, which consists of a case study conducted in a large organization in the retail trade having profit centres. The objective of the empirical phase is to establish the usefulness of the theoretical framework in developing an understanding of the budgetary biasing behaviour in that particular organization.

#### THE EXPLANATORY FRAMEWORK

The explanatory model of budgetary biasing utilized in this study contains two interrelated submodels: an explanatory model for budgetary biasing at the individual level, and a model for budgetary biasing at the organizational level.

#### *An explanatory model of budgetary biasing at the individual level*

The explanatory model of budgetary biasing at the individual level deals with the budgetary planning process in the preparatory phase of budget proposals, which precedes the budget negotiation phase. The main questions in this phase are:

(1) What kind of intentions are linked to the creation of budgetary bias?

(2) Are there some more specific factors behind these intentions? What are these and what is their effect on the action of budgetary biasing?

After posing these questions it seemed natural to base the analysis on a teleological explanation scheme. The most famous formulation of these schemes is the classical practical syllogism first presented by Aristotle, which links together the actor's intentions (his or her fundamental aims), the epistemic assessment of the means at hand for satisfying those intentions, and the resulting concrete action. In this study, however, the original scheme of practical syllogism is developed further following the ideas of von Wright (1976), as an attempt is also made to proceed beyond the pure action intentions and to connect the organizational and situational issues to the explanation. In this way we arrive at the basic explanatory structure presented in Fig. 1.

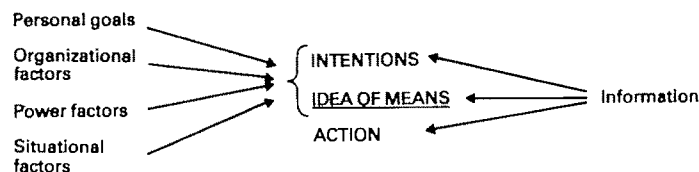


Fig. 1. The basic explanatory scheme.

<sup>9</sup> Compare the basic setting of agency research, e.g. Balman (1982), Tiessen & Waterhouse (1983), Otley (1984) and Pope (1984).

<sup>10</sup> The concept of a political person follows the idea of "heroic man" presented by Lindström (1979). The actor's assumptions of a political person are the same as those inherent in the "garbage-can" view of organizational behaviour, see March (1971, 1978), March & Olsen (1976) and Cooper *et al.*, (1981).

<sup>11</sup> About the essential characteristics of this approach, see e.g. Susman & Evered (1978), Näsi (1979), Mäkinen (1980), Neillimo & Näsi (1980) and Evered & Louis (1981); compare Colville (1981), Tomkins & Groves (1983), Otley (1984) and Hopper & Powell (1985).

Von Wright (1976) distinguished originally four determinants of intentions: wants, duties, abilities and opportunities. In this study their business economic interpretations are defined correspondingly: personal goals, organizational factors, power factors and situational factors (Fig. 1, left). The information factor is added to the structure in order to emphasize its central role at every step of the practical syllogism (Fig. 1, right). Information is thus assumed to be a critical resource of the three basic components of the practical syllogism (compare Pihlanto, 1982).

Human action is regarded as being in a conceptual relationship to intentions which are the final objectives of human action; this is the fundamental message of the practical syllogism (Fig. 1, centre). Behind these intentions — and also behind the cognitive assessment of the means at hand — there are the five critical determinants. These determinants deepen the more aggregate explanation of action given by the practical syllogism. Such a structure is a mixture of teleological and causal explanations.<sup>12</sup> It can be argued that it sets these two ways of explanation into context; intentional behaviour is more characteristic of human action while the causal scheme comes into the picture as structuring the potential action space of the actor.

With regard to budgeting, the more general action bases will be defined first; these are called the *intentions of budgetary biasing*. At the controlled level (i.e. from the budgetee's point of view) two different intentions to bias are distinguished:

(1) *Resource intention*, which refers to an actor's aim of obtaining control of entirely unnecessary or of an excessive amount of resources through biasing, i.e. resources that are not economically rational, at least when considered *ex ante*. Actualization of resource intention results in overestimation of the cost side of the budget. Both types of bias (i.e. budgetary

slack and upward-bias) may be involved here (see Schiff & Lewin, 1968, 1970; compare Williamson, 1963, 1964).<sup>13</sup>

(2) *Performance evaluation intention*, which refers to the role of budgets as short-term targets; here the evaluation of performance is affected through biasing, usually *ex post* but sometimes also *ex ante*. By creating budgetary slack it is possible to confuse the *ex post* performance evaluation and the rewards connected with performance; through upward-biasing it is possible to gain time through making deliberately over-optimistic budgetary promises (see Lowe & Shaw, 1968; Schiff & Lewin, 1968, 1970; Onsi, 1973).

The most important difference between these two intentions is that biasing according to the resource intention is more dangerous from an economic viewpoint as it will lead to the use of resources acquired through biasing. In contrast, biasing which is due to the performance evaluation intention may lead to the most efficient behaviour during the budget period.

Approaching budgetary biasing from the point of view of the controlling level is unusual. Therefore the intentions which are relevant at that level are not yet fully understood. However, there is no evidence to indicate that biasing behaviour is uncommon at the controlling level. Analogous evidence is provided by the theory of the firm concerning the creation of organizational slack at the top levels of the organization (see Williamson, 1963, 1964; Bourgeois, 1981; Kamin & Ronen, 1981). The complexities of this case need to be recognized, not least because of the dual role of the middle managers in an organization; they may at the same time be those who control and those who are controlled in a budgetary context. Such issues are not discussed further here.

In this study, bias at the controlling level is seen as intended to affect the motivation of subordinates. This intention to create budgetary

<sup>12</sup> Compare analogously the idea of a dualistic approach in Roberts & Scapens (1985).

<sup>13</sup> The case of upward-bias is realized when, in addition to overestimating the costs because of the resource intention, also the revenues are overestimated, manipulation of the revenue side being larger than that of the cost side.

bias is called *motivation intention*. Here we run into a controversy in the behavioural budgeting literature: according to some research results a budget ought to be set at an optimistic level in order to gain the best motivational effect (see e.g. Stedry, 1960; Hofstede, 1968). This implies the creation of upward-bias from the viewpoint of the controlling level. A contrary opinion suggests that it is motivationally functional in the long run to leave some "room for manoeuvre" in budgets (see e.g. Caplan, 1971; compare Hopwood, 1974); this implies the creation of slack or, at least, providing the controlled level with an opportunity for it. There is empirical evidence for both types of biasing behaviour at the controlling level: yet the aim of the upward-biasing of the budgets seems to be clearly the more usual (Östman, 1977; Kazandjis, 1980).

Having discussed general bases for biasing action, consideration is now given to more specific factors behind biasing which are called, in accordance with von Wright's (1976) original terminology, *determinants* of budgetary biasing.

### *Personal goals*

Personal goals ("wants" in von Wright's terminology) are extremely important, because they relate closely to the intentional nature of the action. However, this area is somewhat obscure and ambiguous, and it can be approached from several perspectives. Already the mainstream of organizational psychology offers two possible ways to analyse human motivation: content theories and process theories. The former attempts to explain why actors are aroused, and has produced either theories of different dominant motives (e.g. McLelland, 1961; White, 1959) or classification systems for the separate human motives (e.g. Maslow, 1954; Herzberg, 1966). On the other hand, the process theories focus on the problem of choice for action, and have provided insights into different forms of reinforcement principles. From the present perspective, the most significant process theory is the expectancy theory (see especially Vroom, 1964). The present analysis is limited to

the use of Maslow's theory of needs, although the inherent weaknesses of this theory are recognized (see e.g. Miner, 1980).

Maslow's theory consists of a five-step hierarchy of needs and presupposes that the lower level needs must first be satisfied — at least to a reasonable extent — before a person is motivated by needs at the next higher level. Accordingly, when a person shifts to a higher level of needs, those at the lower level become less important (Maslow, 1954; see also Hofstede, 1968; Caplan, 1971).

With regard to budgetary biasing behaviour, it seems justifiable to argue that the most relevant needs of Maslow's hierarchy are safety needs and esteem needs. Active safety needs may encourage the performance evaluation intention — depending on the situation both the *ex ante* and *ex post* alternatives (compare Onsi, 1973; Lowe & Shaw, 1968). They may also lead to reinforcement of the resource intention, especially in situations where budgets are used inflexibly as a resource allocation device (Kazandjis, 1980). On the other hand, active esteem needs may encourage particularly the resource intention; having extra resources under his or her control may be important to the actor's self-esteem (e.g. the desire for power and autonomy) and especially to the esteem of others (e.g. the desire for status, recognition and power) (see Hofstede, 1968; Williamson, 1964).

### *Organizational factors*

Organizational factors can be considered as "duties" that surround the decision-maker (compare von Wright, 1976). As budgeting is a form of organizational control,<sup>14</sup> a budgeting actor is surrounded by many kinds of organizational expectations, norms and other restrictions. Accordingly, individuals are not able to act according to their own motives alone but have to recognize the existence of these organizational restrictions. On the other hand, the organizational control system usually provides inducements for organizationally functional behaviour.

Organizational roles refer to the expectations

<sup>14</sup> About different alternatives of control, see Hopwood (1974) and Merchant (1985b).

of behaviour in an organizational position; roles are one way of coordinating behaviour in an organization (see Mintzberg, 1979). Behaviour which is in accordance with a person's role is usually encouraged in many ways, and behaviour against the role is either punished or ignored (Pfeffer, 1982). As regards budgetary biasing behaviour, it could be argued that the actor's role imposes some kind of general restrictions on the amount and nature of the bias created: it is not usually possible to create as much bias as one would like to. On the other hand, it is possible to note links between organizational roles and the motivation intention to create budgetary bias — the task of a manager includes motivating his or her subordinates.<sup>15</sup>

Organizational norms are beliefs about what behaviour is allowed, prohibited or compulsory in an organization (e.g. Näsi, 1979). In a budgetary context, norms may appear in the form of the budgeting actor's beliefs about the other party's expectations; the ability to estimate "what will go" is one of the most crucial matters in budgeting (Wildavsky, 1979). In addition to the other negotiating party's situation specific expectations, the implications of its general budgeting strategies are also often taken into consideration (compare Hopwood, 1980), as well as more general organizational norms.

Essentially, budgetary bias is linked to organizational norms in two basic ways; these hypotheses apply especially to the controlled level:

(1) The norms may reinforce the creation of bias when they are felt to demand more or less than what seems to be realistic from the actor's point of view. This refers to the problem of reconciling the realistic and the expected. The usual concrete implication is upward-biasing (see Lowe & Shaw, 1968; Östman, 1977).

(2) The norms may restrict budgetary biasing when they are felt to be tighter than the intentions of the actor.

Organizational factors also include the characteristics of the budgetary system, which are here

divided into three groups:

(1) the degree of participation allowed,

(2) the style of use of budgetary control information,

(3) the reward system used.

The effect of participation on the actors' performance has been one of the main themes of behavioural accounting research. The results have been mixed, although the majority have supported a positive correlation between participation and performance (see e.g. Milani, 1975; Kenis, 1979; Brownell & McInnes, 1986). However, the current view seems to be that this relationship is of a contingent type: there are some intervening variables at different levels (e.g. at the cultural, organizational and individual levels) that come into play and affect the strength of the effect of participation and perhaps also the sign of the correlation (compare Hopwood, 1974; Brownell, 1979).

Obviously the degree of participation has an important role as far as budgetary biasing is concerned. A high degree of participation gives the controlled unit an opportunity to take part directly in the creation of bias, and in that way diminishes the superior power of the controlling unit (see Schiff & Lewin, 1968; Mintzberg, 1979). A low degree of participation, on the other hand, restricts the potential for budgetary biasing at the controlled level and provides opportunities for biasing at the controlling level; in this case the relevance of budgets — and also that of budgetary bias — may, however, be rather low (Hofstede, 1968).

The use mode of the budgetary system has been much studied in the past few years, most of the studies having analysed the effects of different kinds of uses of accounting information on decision-makers' performance and on certain organizational and psychological factors (see Hopwood 1972; Otley, 1978; Hirst, 1981; Govindarajan, 1984). The basis for this group of studies was the study by Hopwood (1972), which distinguished three basic types of uses of

<sup>15</sup> As a special case, Wildavsky (1975, 1979) has noted that an implicit division of roles may take place in an organization: some have the role of advocates trying to maximise the resource pool under control, others are guardians, who attempt to restrict the costs allocated. It can be easily understood that these roles have potential links to budgetary biasing.

accounting information: the budget-constrained style, the profit-conscious style and the non-accounting style. He found empirically many problems that were related to the use of the budget constrained style, e.g. high work related tension and stress, poor personnel relations as well as the manipulation of accounting data and the physical process. Hopwood did not present any results concerning the manipulation of the standards, but it could be hypothesized that the use of a budget-constrained style would also reinforce that kind of action (compare Otley, 1978).

There are naturally many different possibilities within one specific style of using accounting information and hence also many alternatives for using the budget-constrained style. One important aspect is the degree of flexibility in the use of budgets. If a budget really cannot be reconsidered and changed during the budget period, it is quite possible that a need might emerge for the creation of some informal possibilities to enlarge the "room for manoeuvre" and, at the same time, to reduce the uncertainty arising from the prospect of running short of critical resources (see Kazandjis, 1980).

The general opinion in the budgeting literature is that budgets affect the motivation to perform in two main ways:

(1) Budgets always have the role of targets; having targets motivates the actors, especially if the targets are internalised. The use of participative budgeting systems is important in achieving such internalisation (see Otley, 1977).

(2) The motivational impact of budgets can be reinforced by linking the reward system to budgetary control (e.g. Amey & Eggington, 1973; Otley, 1977). Such a motivational impact of this link needs to be understood in terms of a larger framework such as the expectancy theory of managerial motivation (Vroom, 1964; Ronen & Livingston, 1975).

With regard to budgetary biasing, these different reward systems and their uses are thought to form the most important group of related factors. Principally, an organization's reward system has the role of encouraging actors to behave in accordance with organizational goals. It is

often stated in the budgeting literature that the mere existence of a reward system (connected to budgetary control) leads to the creation of budgetary slack in order to gain more favourable evaluations *ex post* (Lowe & Shaw, 1968). This effect is magnified if the reward system is asymmetric, e.g. it emphasizes negative budget errors more than positive ones (Schiff & Lewin, 1970). On the other hand, the existence of a reward system may well restrict upward-biasing as it does not usually constitute rational action for the actor in these circumstances. Generally it assumed that the effects of the reward system have the closest links with the *ex post* alternative of the performance evaluation intention.

### *Organizational power*

The inclusion of power in the frame of reference is based on the idea that people do not usually intend to attempt things that, in their judgement, they will not be able to achieve. Actors make intuitive assessments of their own ability to carry through the action they are considering even before they actually set out to reach their objectives (von Wright, 1976). Von Wright originally applied the term "abilities" to this group of determinants.

The concept of power is extremely complex and many-sided, almost ambiguous. Without a more thorough discussion of this concept, a relatively general definition by Pihlanto is presented here: power means "the capability or ability of a social actor to get another party within an organizational-social relationship to behave in a way which the party would not otherwise behave, and also the possibility of an actor to behave as desired regardless of potential resistance" (Pihlanto, 1985 p.8; compare e.g. Dahl, 1957; Mintzberg, 1983; Cooper, 1986).

According to Bacharach & Lawler (1980), two important types of power may be distinguished, authority and influence. The source of authority is the actor's status in an organization. Authority is usually static by nature, hierarchically downward directed and leads to coercive actions towards the subordinates. In contrast, the sources of influence can be manifold: personality, expertise and opportunity. Influence is

characteristically more informal, more flexible and does not (in a strict sense) lead to coercion: it is essentially based on the acceptance of the object of power. The most important basis for power with regard to influence is obviously the control of critical information; it is the most significant way in which the controlled unit gets access to the use of power in a budgetary context.<sup>16</sup> The two types of power may, of course, also work together when someone who has authority also has influence.

From the point of view of budgetary biasing at the individual level, power means either an *ex ante* restriction or a potential for bias. The nature of the effect depends on the actor's preassessment of his or her own relative power, but also on the judgment of the degree of the *ex ante* incompatibility of budget proposals. By definition, the controlling unit has authority and therefore the ability to control biasing at the controlled level. It is usually well able to create its own bias, and even more so if it also has influence, which is not always the case. In contrast, the controlled unit can only have influence. This may, however, be considerable as the actors at the controlled level often have access to critical information, technical expertise for example. Uncertainty of the future is often greater to the superior than it is to the subordinate, who is more closely involved (e.g. Otley, 1978). Influence is obviously a highly convenient type of power as far as budgetary biasing is concerned since the other negotiating party may not be at all conscious of being the object of the use of power!<sup>17</sup>

### *Situational influences*

Situational factors refer to opportunities, i.e. to the individual characteristics of the situation

at hand, which are continuously appearing and disappearing both as a result of human actions and of changes in the environment (see von Wright, 1976). In this study situational factors are interpreted to mean contextual factors, i.e. we use the ideas of the contingency approach, which is today one of the most prominent ways of thinking in business economics (see Burns & Stalker, 1961; Woodward, 1965; Thompson, 1967; Pugh *et al.*, 1969; Child, 1972; Bruns & Waterhouse, 1975; Hayes, 1978; Waterhouse & Tieszen, 1978; Wood, 1979; Otley, 1980; Tieszen & Waterhouse, 1983). In this part of the analysis two situational factors will be dealt with: the financial position of the firm and uncertainty.

In the budgeting literature the financial position is usually considered to be one of the most significant explanatory factors of budgetary biasing; the discussion has mainly been focused on the profitability of the firm and its subunits (compare Cyert & March, 1963; Williamson, 1964). Here we distinguish two situations: poor and good profitability.<sup>18</sup> The analysis is based on the hypothesis that it is the profitability of the controlled unit that has the dominant role as far as the effects of profitability on budgetary biasing behaviour are concerned.<sup>19</sup>

(1) Good profitability. It is hypothesized that there are only minor restrictions on the creation of budgetary slack, i.e. that slack may be created through budgets (Cyert & March, 1963; Östman, 1977). In this case the resource intention may become particularly relevant. Upward-biasing may also be possible, but it does not appear to be rational for the actor.

(2) Poor profitability. The potential for the creation of budgetary slack is probably restricted as cost-cutting policies may take place in the organization (see e.g. Williamson, 1964). On

<sup>16</sup> Compare the agency theoretic interpretation of asymmetric information of the negotiating parties, e.g. Balman (1981) and Pope (1984).

<sup>17</sup> About the notion of unconscious power, see Pihlanto (1985).

<sup>18</sup> The meanings of these notions are not discussed in depth here. We refer to the generally subjectivistic approach of this study; what is essential is that the relevant actors consider the profitability to be good or poor.

<sup>19</sup> Of course a more distinctive theoretical analysis might also have been made, for example those situations discussed where the firm's overall profitability is different from some subunit's profitability.



the other hand, upward-biasing may seem rational from the controlled unit's point of view (Lowe & Shaw; 1968; Östman, 1977); there may even be pressure towards upward-biasing from the part of the controlling unit.

Kazandjis (1980) has noted, however, that extra resources are sometimes allocated in both "bad" and "good" years. In the former case this may be possible by means of manipulating both the revenues and the costs upwards, e.g. in such a way that the budgeted profit does not change to any significant extent.

Uncertainty is here understood to refer to the epistemological problem of knowing something about the future; strictly speaking it is, of course, impossible to *know* anything about it (see Ketonen, 1981). However, probabilistic estimates can be made about the future values of the parameters and variables that are of interest. In fact budgetary biasing is a phenomenon that is based on the unavoidable uncertainty linked to budgeting. It is expressly this uncertainty that provides the "room for manoeuvre" for both the negotiating parties. Asymmetries in the control of uncertainty are essential strategic elements of biasing behaviour.<sup>20</sup>

In the budgeting literature uncertainty is usually regarded as one of the main contributors to biasing behaviour (see Schiff & Lewin, 1970; Onsi, 1973; Kazandjis, 1980). Generally speaking, uncertainty may easily lead to a need to prepare oneself for it, just to be on the safe side, and may quite naturally imply the activation of all the possible intentions:

(1) The resource intention, because the amount of needed resources is not clear *ex ante*. This effect will be magnified if there is both a high level of uncertainty and an inflexible use of budget allocations. In concrete terms, this may mean the creation of both budgetary slack and upward-bias.

(2) The performance evaluation intention; because achieving the budget is not guaranteed *ex ante*, an attempt is made to ensure it through the

creation of budgetary slack (the *ex post* alternative). Of course the *ex ante* alternative of the performance evaluation intention also may be activated e.g. if there is a high degree of uncertainty, and at the same time the profitability of the unit in question is not satisfactory; in this case uncertainty provides an opportunity for this manipulation.

(3) Motivation intention: a high degree of uncertainty provides an opportunity e.g. of trying to motivate subordinates by attempting to agree on optimistic budgets. Because it is not certain that the budget proposal of the controlled level is realistic there may also emerge a need to counterbias the budget proposals (i.e. cut the suspected slack or upward-bias).

Overall, a high degree of uncertainty probably has a two-fold role in the budgetary biasing context: on the one hand it may reinforce the different intentions of biasing or counterbiasing action, on the other hand it also provides an opportunity for biasing.

### *The role of information*

Budgeting can be interpreted as a process of elaborating information. It may also be viewed as an organizational market for information as the negotiating parties are offering and demanding information in accordance with their individual preferences.

We are concerned here with two types of information: historical information and information about the future. Historical information consists of both the formal records of the organization (budgets, budgetary control reports, other accounting information etc.) and the informal "memory" of the actors in the organization (e.g. opinions about norms and power relations). The most important role of this type of information is to shape and define the original situation. Historical information, at least the formal part of it, is usually interpreted as the hard core of budgetary planning.<sup>21</sup>

An emphasis on historical information is

<sup>20</sup> See discussion of power, above, especially the sources of influence.

<sup>21</sup> Compare the notion of incrementalism in budgeting, e.g. Wildavsky (1975) and Hopwood (1980).

bound to cause static budgeting and it seems to affect budgetary biasing in two ways. On the one hand, assuming that the environment is fairly stable, it makes it easy to maintain existing bias in budgets and, on the other hand, it restricts the creation of any new bias. Environmental possibilities, of course, may change — an emphasis on historical information may then also cause unintentional bias in budgets.

An analysis of the past is usually not enough, however. Even the most careful analysis cannot solve the principal problem of budgeting being directed to the uncertain future. Information about the future is linked to individual and organizational expectations and it is especially this that brings an element of gaming to budgeting. An emphasis on estimates about the future implies that room is given for the active creation of bias in budgets, even though it often is a rational strategy for the organization to follow because of the environmental changes that are expected. There is no positive way to demonstrate that any evidence is absolutely unrealistic, too pessimistic or too optimistic; everything is more or less subjective. Many kinds of bargaining and simplification strategies, as well as power rela-

tions can come into play in such circumstances (Hopwood, 1980).

Figure 2, which is based on the basic explanatory structure presented above, portrays a summary of the most important results of our analysis of budgetary biasing at the individual level. It reflects an attempt to gather together the hypothetically relevant factors, to structure them hierarchically (intentions and determinants) and to analyse their expected effects on budgetary biasing behaviour at the individual level. As with many other important organizational phenomena, budgetary biasing is shown to be at the centre of many interrelated and sometimes even contradictory factors. An actor's intentions are interpreted as the synthetic core of his or her behaviour.<sup>22</sup>

#### AN ORGANIZATIONAL MODEL FOR BUDGETARY BIASING

In the previous section, the individual aspect of biasing behaviour has been discussed. In this part of the analysis, the organizational aspect will be considered.<sup>23</sup> In concrete terms an organizational analysis of biasing behaviour means un-

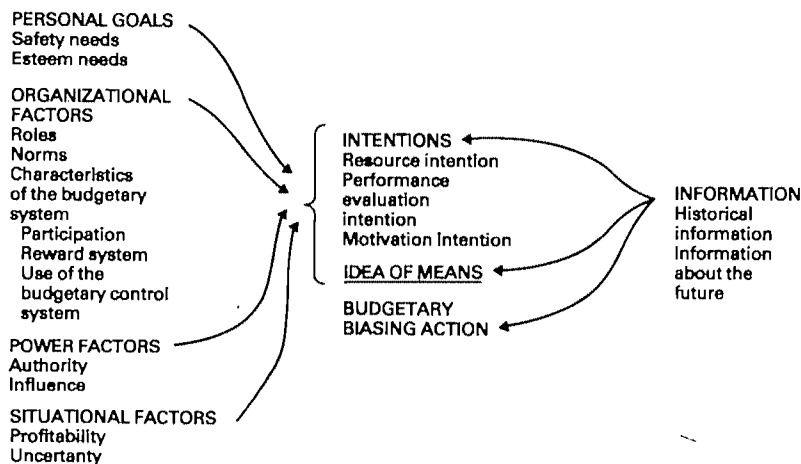


Fig. 2. Intentions and determinants of budgetary biasing.

<sup>22</sup> It would also be possible to go further and present the expected directions of influence of these factors (either reinforcing, restricting or potential creating) and at the same time to take into consideration the two concrete types of biasing.

<sup>23</sup> This aspect has recently become dominant in the U.K. behavioural accounting research in contrast to the more micro orientation adopted in the U.S.A., see Hopwood (1978) and Otley (1984).

derstanding the actual budget negotiation phase. The aim is to obtain some preliminary insights into the role of biasing as a means and a result of budget negotiations. The limitations of any such analysis must be recognized, however. Such interesting and important aspects of the process as dynamics and learning are still excluded because the emphasis in the original study (Lukka, 1985) was primarily on the individual aspect.

Figure 3 shows the general framework for the whole study as well as portraying an outline of the links between the two submodels of biasing behaviour.

Budgetary biases 1 and 2 are the potential biases created in the parties' budget proposals — bias 1 at the controlling level and bias 2 at the controlled level. On the other hand, biases 3 and 4 are the potential biases of the final budget — bias 3 evaluated by the controlling unit and bias 4 evaluated by the controlled unit.

The fundamental idea behind Fig. 3 is to point

the role of budgetary biasing in the budget negotiations? As far as organizational analysis is concerned, two points are stressed: conflicts in the negotiations, and power factors. The effects of power are realized in the budget negotiations — the real negotiating power is revealed and possible incorrect preassessments emerge.<sup>24</sup> The result of these negotiations is usually a budget at the controlled level, which may, of course, still include biases (biases 3 and 4). Hence there are four principal kinds of budgetary biases in the process, the different interpretations emerging because the forecasts made by the different actors are subjective by nature.

In trying to reveal the principal features of the conflicts in budgetary negotiations and the role of bias in relation to them, the situation is somewhat simplified. The elements of the analysis are two organization levels, the controlling ( $N + 1$ ) and the controlled ( $N$ ) — or strictly speaking two actors at these two levels — their forecasts

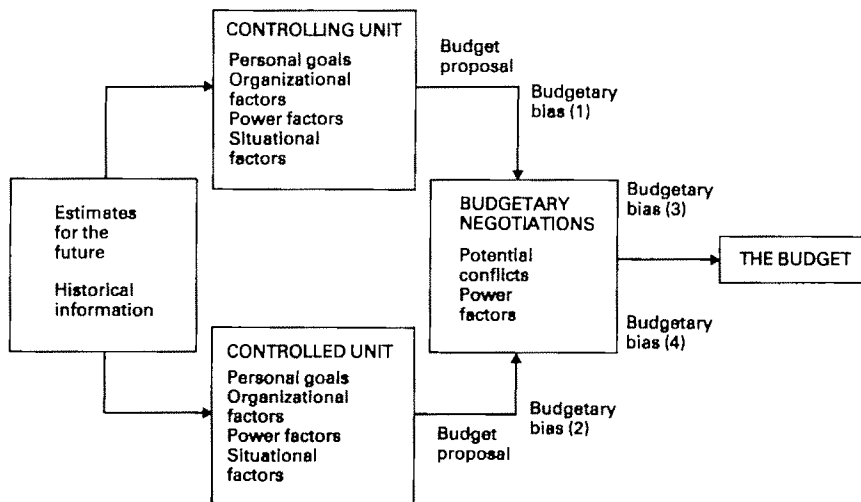


Fig. 3. Budgetary process from the biasing viewpoint.

out that the bias contained in a final budget is not the result of only one actor's intentional behaviour, but rather the result of the dialectics of the negotiations. The right hand side of the figure refers to the organizational analysis: what is

(“honest budget estimates”) and their budget proposals. There are three principal alternatives:

- (1) the forecasts made by the parties are the same<sup>25</sup>;
- (2) the forecast at level ( $N + 1$ ) is higher than

<sup>24</sup> Otherwise we refer to our analogous discussion on power above.

<sup>25</sup> The meaning of “the same” should not be interpreted here quite literally.

that at level  $N$ ;

(3) the forecast at level  $(N + 1)$  is lower than that at level  $N$ .

The first of these alternatives is illustrated in Fig. 4.

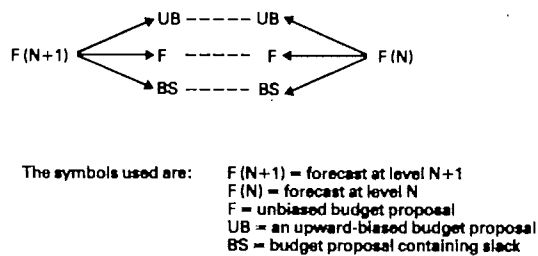


Fig. 4. A negotiation situation of minor conflict.

Two points should be made about the illustration used here:

(1) The budget proposal alternatives ( $UB$ ,  $F$ ,  $BS$ ) of both parties are lying on an "invisible" vertical axis representing the level of the budget proposal (the higher the proposal the more difficult it is).

(2) The fact that the budget proposal alternatives of the parties are represented as being exactly at the same level should not be interpreted quite literally. More important than the exact amount of bias is the direction of the biases in the diagram.

In the first case sketched in Fig. 4, the parties have a common view of the future as their forecasts are the same — therefore their possible biases are also interpreted in the same way. As a result this situation may be regarded as implying no major conflicts. Naturally, conflicts are possible in this situation if the parties intend to create bias in different directions, or if their biases are not of the same magnitude.

The second alternative is illustrated in Fig. 5.

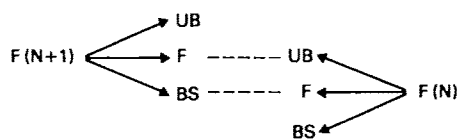


Fig. 5. Principal's forecast higher than that of subordinate's.

In this case the parties' forecasts differ, and the probability of conflicts is therefore greater than in the first alternative. There is no common ground for the negotiations and thus there is room for misinterpretation. For example, the unbiased budget proposal of the controlling unit seems to have an upward-bias from the point of view of the controlled level. The equilibrium points in this situation are, the budget proposal of the controlling level mentioned first,  $F/UB$  and  $BS/F$ , which are both alternatives where one of the proposals is biased! The situation  $UB/BS$  naturally gives rise to the most conflict.

With regard to alternative two, it is also possible for the "union" of the budget proposals to be zero, as is illustrated in Fig. 6. Hence, when the difference between the parties' estimates is sufficiently large, the original situation leads to conflict in each case — only the intensity of the conflict differs depending on which direction and how much the proposals are biased.

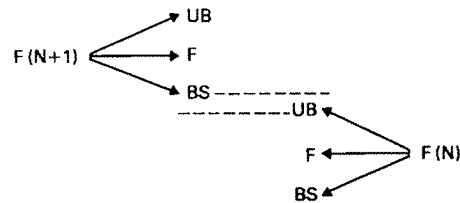


Fig. 6. A situation without overlapping negotiation area.

The third alternative is illustrated in Fig. 7. The equilibrium point in this example is  $UB/BS$ , again a situation where the proposals of both parties are biased. The greatest conflict will arise in situation  $BS/UB$ . It is naturally also possible that in the third alternative there is originally no equilibrium area.

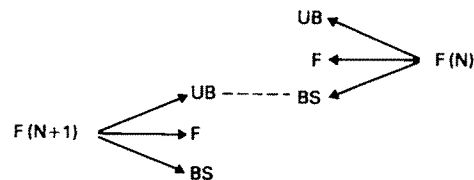


Fig. 7. Principal's forecast lower than that of subordinate's.

Budgetary bias may thus either intensify or dampen the conflicts in budget negotiations. How wide a gap there is between the parties' budget proposals depends upon their forecasts and their possible biases (direction, amount). If the parties' forecasts are at different levels, reaching equilibrium presupposes bias in at least one party's budget. The direction of the biases created by the parties is also of importance: the contradiction will be intensified if those biases are directed outward from "the area of compromise", i.e. the area which lies between the parties' forecasts.

The above discussion refers to the starting position in budget negotiations. During the settlement of a budget this position may change considerably: there will usually be a great deal of argumentation and exchange of information, and power factors really come into the picture. This probably leads to the parties' forecasts getting closer to each other. Furthermore, it also implies that the biases that may have been created are diminished or, at least, given a new interpretation. It is, of course, possible that equilibrium (the budget) is reached without any bias at all. It is more likely, however, that although some convergence may take place, some bias is still needed to reach a solution, if the starting point was either the second or the third alternative illustrated in Figs 5 to 7 above.

### THE EMPIRICAL STUDY

The empirical part of this study proceeds towards a general picture of budgetary biasing behaviour by means of testing the usefulness of the framework previously developed in a relatively large firm with several profit-centres. The chosen method was to perform intensive action research in just one firm because the phenomenon of biasing is of a rather sensitive nature.

#### *The firm studied*

The firm selected for study operates mainly in

the household supplies retail trade, but has also some activities in the hotel business. It is a cooperative society and has close links with one of the major groupings in the wholesale trade in Finland. Founded in 1916, the firm has experienced many ups and downs during its history. The 1970s were a particularly difficult period and for several years it made no profit at all. The major causes of its difficulties were its slowness to change, its rather small and poorly judged investment programme and the intensifying competition in the retail business in Finland. In 1981 and 1982, the period of the empirical study, the firm was intensively trying to recover its profits, but with only minor success.

The study was concentrated on the most critical part of the firm namely its daily goods line, which is one of the three almost independent business lines of the firm. In 1982 it accounted for 57% of the sales of the firm, but its profitability had not been satisfactory for the past couple of years. The daily goods line manager had under his direction two hierarchically subordinate organization levels; directly below him there were four group managers, who, in turn, had altogether 56 retail unit managers reporting to them.<sup>26</sup> These units — mainly small retail shops, but also various departments in the firm's department store — were directly in contact with the market. Hence, the part of the firm that was of special interest to this study comprised three levels of hierarchy: the line manager, four group managers and 56 retail unit managers. All these levels were in fact accountable for their profits, although this responsibility was of only an unofficial nature at the group manager level.

The primary function of the management accounting system of the firm was to provide control information about the profit-centres; the control was based on budgets which were negotiated on a yearly basis. The budget control periods were one month and one year. The most important figures to be considered were the profit (using a residual income measure), the contribution margin (using a marginal costing sys-

<sup>26</sup> The four groups of the daily goods line were distinguished according to the different nature and size of the retail units they consisted of.

tem) and sales. The budgeting process involved a great deal of participation; the process began at the lowest level of the hierarchy (the retail unit managers) and included numerous meetings, negotiations and discussions at different organizational levels. On the whole, the relevance of budgets appeared rather high in the firm. This may be attributed to the relatively strong emphasis on the control phase of the budgeting process: budget variances were computed and analysed actively on the basis of continuous and regular reporting. Also, budgets were used as major reference points in the evaluation of the actors' performance.

### METHOD

As the action-oriented research approach was used in this study, the emphasis in the empirical part was on qualitative information. The research material was collected mainly in the form of semi-structured ("theme") interviews at different levels of management. Additional research material was gathered by direct observation (mainly by attending budget meetings) and through analysis of budgetary planning and control materials.<sup>27</sup> The focus in this part of the study was on the two lowest management levels of the daily goods line: all four group managers were interviewed; at the unit level two retail unit managers from each group were interviewed. The manager of the daily goods line, the company controller and the managing director of the firm were also interviewed — the latter two more than once. The interviews lasted for 1–3 hours. A tape-recorder was not used during the interviews in order to create a confidential atmosphere.

The most important principle in interviewing was one of flexibility. Usually the themes discussed went from the general to the particular, but the order was changed as necessary according to the interests of the persons being interviewed. In this respect the interviews resembled normal

discussions. The main method of controlling the statements of the actors interviewed was the use of budgetary planning and control material, which was available in almost unlimited quantities.

The most difficult problem in the empirical part of the study was how to measure the variables — especially budgetary bias, which is not easily operationalized. As the approach was basically qualitative, the method used was to measure bias indirectly. Information about biasing was acquired by means of:

- (1) clarifying the general attitudes of the interviewees to biasing;
- (2) getting the interviewees to make statements about their actual biasing behaviour;
- (3) finding out what the interviewees knew or what they thought about their colleagues' biasing behaviour (at their own organizational level and at other levels).

Surprisingly the interviewees tended to discuss the biasing behaviour in the firm, as well as their own biasing patterns and their related intentions or reasons, rather openly. However, it should be borne in mind that a great deal was no doubt left unsaid.

### RESULTS

Firstly, both forms of budgetary bias were observed in the firm. The traditional type of bias (budgetary slack) still seemed to be more common than upward-bias. At the first sight this may seem somewhat surprising as the profitability of the whole firm was unsatisfactory. However, as far as budgetary bias is concerned, the profitability of the groups and the retail units seemed to be more important than the profitability of the whole firm. Therefore the other possible explanatory factors of the theoretical framework were taken under consideration.

At the group level in the hierarchy different biasing "profiles" could be distinguished among the four groups studied. In two of them, the cre-

<sup>27</sup> The primary basis for the methodological choices are Hägg & Hedlund (1979), Neergaard (1981) and — with regard to making theme interviews — Hirsjärvi & Hurme (1982).

ation of budgetary slack was the dominant behaviour pattern; these were the relatively more profitable groups and financially less important to the economy of the daily goods line, therefore these two groups were also subject to less pressure by the upper management. In one of these two groups, patterns of slack creation seemed to be highly institutionalized: the group manager and at least some of his subordinate retail unit managers had an informal agreement to create some slack in budgets. This was linked with the pressures the group manager felt in relation to his own budget attainment. With regard to this group, there was also a potential historical explanation for this behaviour pattern: the group manager's earlier chief had been an extraordinarily authoritarian person, who had not wanted to listen to any explanations if the budgets were not achieved; so the group manager had obviously adopted the aim of always trying to be on the safe side.

On the other hand, in the other two, less profitable but economically more important, groups in the daily goods line, both the creation of budgetary slack and upward-biasing occurred. One case of upward-biasing was a clear example of an attempt to show recovery of the unit and satisfactory profitability at least *ex ante*. The unit in question was one of the poorest in the whole firm, and was constantly under the threat of closure. The unit manager had been newly appointed to his job and felt that he really had nothing to lose. Pressure from the upper levels of the organization and his own ambitions made him budget optimistically.

On the whole the theoretical framework developed in the study was felt to constitute a valid basis for an empirical analysis of this firm: the budgetary biasing behaviour could be understood through the factors included in the framework. Although the biasing intentions were often somewhat unclear, the most important of the three biasing intentions defined above seemed to be, in this firm, the performance evaluation intention. It seemed to explain the major part of both the creation of budgetary slack (the *ex post* alternative) and upward-biasing (the *ex ante* alternative). There was also some

evidence of the motivation intention: one group manager stated that he encouraged his subordinates to create slack in their budgets in order to improve their work motivation. His aim was a situation where his subordinates would compete with each other in showing positive budget errors. However, even in the case of this particular group manager, it was difficult to distinguish between the "pure" motivation intention and the group manager's own ambitions and uncertainty with regard to his controlling level, the daily goods manager, i.e. from the group manager's performance evaluation intention. Perhaps these two things are in actual fact inseparable.

It was also possible to indicate some of the determinants of the framework developed as potentially more important explanatory factors in budgetary biasing than others. These included both types of personal goals, organizational norms, the degree of participation, the reward system, both types of power factors, the profitability situation as well as uncertainty. Evidence of the other factors included in the theoretical framework was either not clear or there was no such evidence. Of course the role of information was imbedded in the process of budgeting and budgetary biasing, but distinguishing it empirically from other related factors proved difficult.

The budget negotiation process in the firm also offered some interesting insights into the role of bias and biasing behaviour in practice. In some cases there was evidence of "battles" where the authority (and influence) of the group manager and the influence of the retail unit manager clashed, e.g. on the question of what was a "sufficient" budget level in the longer term. It appeared that the asymmetry of information, which was usually in favour of the unit managers, at least gave them equal status with the group managers in negotiations. There was also some evidence that, in this firm, satisfactory profitability in the past has a great deal of influence on the setting of budget levels.

In one of the groups almost no conflicts arose during negotiations: the degree of participation was high and the norms of the controlling level had probably already been considered prior to

the negotiations. Another group gave the impression that possible conflicts between the group manager and his superior were solved through the creation of slack in the budgets of the retail units in the group; this case resembled a situation where the forecast of the controlling unit is originally lower than that of the controlled unit.<sup>28</sup>

Something similar happened in another group where the budget of one of the retail units was considerably reduced when the group manager learned the budget claim for the group (a target level presented in the whole firm's plans). The "budget adjustment", as the group manager called it, was done by reducing the percentage of the budgeted contribution margin of one of the units in the group from 12.8% to 12.3%. The unit manager in question was not very pleased about this deterioration in his budget. During the interview he stated that in his unit the internal target level of the contribution margin would still be 12.8%.

To conclude this short presentation of the empirical results obtained, some additional points can be made:

(1) The managers seemed to make a rather clear distinction between their behaviour in principle, and their real actions. At least one unit manager stated that he was against all kinds of budget manipulations, while at the same time his budgetary actions clearly also included the creation of bias. One possible explanation for this is that the managers felt some biasing to be a legitimate part of the game of budget control.

(2) Optimistic budgeting of revenues, which usually implies increases in the budgeted costs, was something of which the group managers were particularly wary. This reflected their experience that if the budgeted revenues were not realized, a disproportionately large negative budget error on the bottom line could easily materialise, because the budgeted costs tend to occur independently of the level of the realized revenues.

(3) There emerged evidence of an interesting budgeting strategy that might be called "the

compensation method". Basically this strategy takes advantage of the limited monitoring abilities of the controlling unit — it is usually only interested in some key figures in both planning and control. The compensation strategy includes the allocation of bias into costs which fall outside the routine monitoring of budget figures. In this way any slack that the controlled unit may have lost in the key figure areas can be compensated for elsewhere. The result may be a profit line which is unbiased when considered as a whole, but biased when its components are examined separately.

(4) One method of biasing was to make intentional mistakes or deliberately avoid correcting mistakes noticed during the preparation of budgets. This occurred twice in the empirical study. One retail unit manager had "forgotten" to budget one group of his income (rents), thereby creating slack in his budget. Another retail unit manager said that his heating costs were budgeted to follow the upward trend of those costs, while he actually knew that a technical improvement was probably going to reduce them by about 30%. Since nobody noticed the mistake, he did not correct the figure, obviously intending to have a slack budget.

To sum up, the empirical part of this study showed, in essence, that it is possible to approach budgetary biasing from an action-oriented viewpoint, applying the framework developed in this study. In addition, the details in the empirical part deepened and sharpened the picture of budgetary biasing which had been created by the prior theoretical analysis.

## SUMMARY AND CONCLUSIONS

The objective of this study was to increase the understanding of budgetary biasing behaviour. Essentially it attempts to construct an explanatory model of budgetary biasing and to test its adequacy in understanding the biasing actions in one particular case. An action-oriented (hermeneutic) research strategy and a descriptive

<sup>28</sup> As an example of this situation, see Fig. 7.



(non-normative) approach were used.

The findings of the study may be grouped into theoretical and empirical results. The theoretical results constitute a framework which was based on an analysis of the basic concepts (the concept of budgetary bias, its subcomponents and nature), and the further development of two interrelated submodels: an explanatory model for budgetary biasing at the individual level, and a model for budgetary biasing at the organizational level.

The explanatory model of budgetary biasing at the individual level dealt with budgetary planning during the preparatory phase of budget proposals, which precedes the budget negotiation phase of the process. This analysis used practical syllogism as the basic explanatory scheme, which was further amended with regard to the specification of the determinants of the intentions. The theoretical analysis based on this structure contained an examination of three different intentions to create budgetary bias: resource intention, performance evaluation intention (these two at the controlled level in the organization) and motivation intention (at the controlling level); these were used as the more general explanatory factors of the model. The five groups of the more specific explanatory factors were thoroughly analysed and subsequently divided into several subfactors.

The organizational model for budgetary biasing examined the actual budget negotiation phase from the viewpoint of budgetary biasing. In this context it was established that, depending on the forecasts and the directions of the biases of the negotiating actors, budgetary bias may have (in principle) either an intensifying or a dampening influence on conflicts in negotiations. It was also noted that the budgetary bias contained in the final budget is of a different character to the biases included in the budget proposals which precede it: if there is bias in the final budget, it is a result of the dialogue between the negotiating actors (assuming of course that there is at least some participation) and hence

does not usually represent either of the parties directly.

In the empirical part of the study an attempt was made to proceed towards a general picture of budgetary biasing behaviour by means of testing the usability of the developed framework in a relatively large firm with several profit-centres. The research material was collected mainly in the form of semi-structured ("theme") interviews at different levels of management. Additional research material was gathered by direct observation and through analysis of budgetary planning and control materials.

Both forms of budgetary biasing were observed in the firm; in this case the creation of budgetary slack still seemed to be more general than upward-biasing. The theoretical framework developed was generally considered to provide a valid basis for understanding and interpreting the budgetary biasing behaviour in this firm. It was also possible to indicate some determinants within the framework as potentially more important explanatory factors than others. The empirical part showed that it is possible to approach budgetary biasing from the chosen action-oriented viewpoint, and to apply to it the framework developed in the study. In addition, the details that had emerged from the empirical part deepened and helped to clarify the picture of budgetary biasing that was created in the theoretical part of the study.

What has been learned then is, in essence, that budgetary biasing is an important part of organizational life. This complex and many-sided phenomenon is a result of an interplay of many different factors on the basis of which the author has tried to construct a theoretical framework. It seems that this way of structuring the context of budgetary biasing and the relationship of the relevant factors is useful; the empirical part of the study offered some preliminary evidence on this adequacy. How useful the framework really is must be a question of continuing research endeavour.

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## TOWARDS AN ORGANIZATIONAL THEORY OF THE TRANSFER PRICING PROCESS\*

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### Abstract

Understanding the transfer pricing issue as it arises in large decentralized firms is important, because it represents a pervasive problem in the design of managerial accounting and control systems in complex organizations. This paper draws on the growing literature on the economics of internal organization to develop an understanding of the strategic, organizational and transactional conditions under which transfer pricing (and related control) issues arise, and the organizational processes used to implement intra-firm transfers of products and to determine transfer prices. The objective of the paper is to develop a theory of the transfer pricing process and to deduce hypotheses from the theory.

The objective of this paper is to build a theory of the transfer pricing process within firms and to develop testable hypotheses about transfer pricing mechanisms and policies given variations in firms' strategic, organizational and transactional conditions. The paper responds in a general way to recent calls by Hopwood (1983), Kaplan (1983, 1984, 1986a, 1986b), Jensen (1983) Covalleski & Aiken (1986), and Johnson & Kaplan (1987) to study accounting, not in simplified, abstract settings, but rather richly imbedded in organizational context. More specifically, the paper fits into that set of research which is aimed at the eventual development of a positive theory of management accounting. Preliminary efforts in this direction are to be found in recent papers by Spicer & Ballew (1983) and Waterhouse & Tiessen (1983).

There are two points of departure for the paper. The first is the growing body of work on the economics of internal organization which is

aimed at improving our understanding of alternative ways of organizing economic activities in markets and hierarchies. Of particular importance for this paper is the work of Williamson (1970, 1975, 1979, 1985) which develops a theory of economic organization that tries to explain why economic activities have been organized in particular ways and the key factors involved in these choices. The second point of departure is an important theoretical paper by Watson & Baumler (1975) which attempts to place transfer pricing into a behavioral context by introducing a theory of decentralization into the transfer pricing literature. This paper accepts Watson & Baumler's work as the state of the art in terms of theoretical understanding of the transfer pricing process, and draws on the developing literature on the economics of internal organization to address issues not answered or insufficiently developed by Watson & Baumler.<sup>1</sup>

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<sup>1</sup> The Watson & Baumler (1975) paper is not the only paper in the literature that has taken, or has alluded to, an "organizational behavior" approach to transfer pricing. However, it does represent the most complete, integrated organizational behavior approach to transfer pricing that currently exists. As such it is convenient and useful to accept it as "state of the art" and proceed from there.

The paper is structured as follows: the first section provides a perspective for the rest of the paper based on a brief review of the classical transfer pricing literature and recent calls for the introduction of organizational context into the study of management accounting issues. The second section draws on the literature on the economics of internal organization to address a number of theoretical issues either not answered, or insufficiently developed, by Watson & Baumler in their article. The objective is to construct a theoretical framework of the transfer pricing process and to present a number of hypotheses relating to the internal transfer of intermediate products. The third section presents a series of hypotheses based on the theoretical framework developed in the second section of the paper. The final section of the paper presents a summary and conclusions and suggestions for follow-on empirical research.

#### CLASSICAL VS AN ORGANIZATIONAL APPROACH TO THE TRANSFER PRICING PROBLEM

Internal transfers of intermediate products between subunits of firms take place under a wide range of organizational conditions. Understanding how internal transfers are governed clearly involves a consideration of the organizational setting in which the transfers take place. However, classical academic treatments of transfer pricing generally start by specifying a restrictive set of assumptions on organizational conditions under which the analysis will be conducted: interest is centered on "... presenting a set of transfer pricing rules that integrate the complex elements of the organization in order to allow for divisional autonomy while recognizing global organizational goals" (Abdel-khalik & Lusk, 1974, p.9). Using this global profit maximizing approach it is common to attribute conflicts between the subgoals of divisions, and the global goal of the firm itself, to inadequacies

in the transfer pricing model. Development of an optimum transfer pricing model (using analytical, mathematical or simulation techniques) that does not result in some form of suboptimization is not an easy task; as can be seen from the current state of the transfer pricing literature.<sup>2</sup>

This classical approach has both advantages and limitations. One advantage of the use of restrictive assumptions on organizational conditions is that it allows the researcher to define the problem to be studied as a transfer pricing problem without explicit reference to the wider process of management control. This allows the researcher to investigate the properties of new or alternative ways to set transfer prices, and to study incentive and risk-sharing attributes of reward systems based in whole, or part, on performance measures making use of transfer prices. What this approach does not do, is lend itself to a deeper understanding of the dimensions of the entire transfer pricing process, in the wide variety of organizational contexts within firms in which transfer pricing systems operate.

An organizational theory of the transfer pricing process requires a wider consideration of relationships among a firm's diversification strategy, its intra-firm transactions, its organization structure and its management accounting and control systems. The resulting theory should help to explain observed transfer pricing practices and provide a context for interpreting research aimed at investigating the properties of new or alternative ways of setting transfer prices under restrictive assumptions about underlying organizational conditions.

There is growing support for such an approach to the transfer pricing problem. Both Swieringa & Waterhouse (1982) and Eccles (1983), for example, insist that the objectives that can be accomplished with a particular transfer pricing method are dependent on a firm's organization structure — a position that stands in sharp contrast to the classical approach. Based on his recent extensive review of the transfer pricing literature, Grabski (1986, p. 61) con-

<sup>2</sup> See Grabski (1986) for a useful, up to date review of the transfer pricing literature.

cludes that one of the things that is now needed "... is further examination of the impact of the organization of the firm on transfer pricing." This conclusion is best viewed as a reflection of the growing support among accounting researchers for developing theory and studying accounting issues in their organizational contexts. Commenting on the presentations at a conference at UCLA on "Accounting in Its Organizational Context" Hopwood (1983, p. 303) notes that to date "... we have few insights into factors which influence accounting systems in the contexts in which they operate." In his view "What is needed are more substantive investigations oriented towards providing bases for understanding or explaining the workings of accounting in action". Other academics have also written about the need for the development of insight, understanding, and the eventual development of positive theory by observing management accounting practice in its organizational context. Kaplan (1986b, pp. 445-446), a prolific writer on this theme,<sup>3</sup> writes:

Cost accounting and management control procedures function in complex organizational settings. Therefore, our initial effort to observe and describe management accounting practice must capture the richness of the organizational context. ... It is hard to imagine how to test theories in management accounting if the testing is not performed in actual organizational contexts.

The approach adopted in this paper is to draw on existing theoretical work to deduce a theory of the transfer pricing process to guide later empirical investigation in the field. Maher (1983, p. 25) provides support for this approach when he writes about the general state of research in management accounting:

The lack of theory and testable hypotheses [in management accounting] limits our opportunities for systematic empirical work. Of course much can be learned from purely descriptive studies — inductive reasoning can

play an important role in developing theory and testable hypotheses. But I believe that the next major breakthroughs will come from empirical work that follows theory.

## TOWARDS A THEORY OF THE TRANSFER PRICING PROCESS: POINTS OF DEPARTURE

### *The economics of internal organization*

Recent work on the economics of internal organization can assist understanding of alternative ways of organizing economic activities in markets or hierarchies (firms). Seminal works in the field include Coase (1937), Alchian & Demsetz (1972), Williamson (1970, 1975, 1979 and 1985) and Jensen & Meckling (1976).<sup>4</sup> Recent papers in the accounting literature by Spicer & Ballew (1983), Waterhouse & Tiessen (1983) and Swieringa & Waterhouse (1982) have drawn on the theoretical work of Williamson, in particular, to understand firms' choices of internal accounting and control mechanisms.

The markets and hierarchies approach, or organizational failures framework (OFF), regards transactions and contracts as the basis of all economic exchange. The fundamental unit of analysis is the transaction, which can vary from simple to complex. The analysis of transactions focusses on the differential costs of completing transactions under alternative institutional arrangements that govern the contracting relationships. Transaction costs are recognized as nonzero, nontrivial, and generally increasing with the complexity of the transaction. Thus different types of transactions may require different types of governance structures to organize them. "Organization failure" is said to occur when transaction costs (or difficulties) can be reduced by shifting those transactions to an alternative organizational arrangement.

For any like set of transactions there are two

<sup>3</sup> Kaplan makes similar points in Kaplan (1983, 1984, 1986a) and in Johnson & Kaplan (1987).

<sup>4</sup> Jensen (1983, p. 324) also notes that "The last decade has been marked by a growing interest in organizations in the economics profession" and that while the science of organizations is still in its infancy, the foundations of a powerful theory of organizations is being put into place. Jensen (1983, p. 324, footnote 9) provides a more extensive list of references to scholars who have made contributions in this area.

basic levels of choice: a choice between markets and hierarchies; and for those transactions organized within hierarchies, joint choices of strategy (with respect to the firm's market and technological opportunities) and internal organizational structures and processes to achieve these chosen strategies. The efficiency with which a firm pursues its chosen strategy will depend on the manner in which the firm subdivides its economic activities, forms the employment relation and structures its management accounting and control systems (Spicer & Ballew, 1983, p. 82).

In the markets and hierarchies framework, the level of transactional difficulties associated with exchanges (in both markets and hierarchies), are linked to the interaction of a core set of human and environmental factors with the dimensions of the transaction itself. Bounded rationality and opportunism are key human factors. Bounded rationality refers to individuals' limited abilities to avoid error and behave in a rational manner when faced with complex problems and decisions. Opportunism extends the usual economic assumption of self interest to allow for strategic behavior by individuals. Because opportunistic behavior can involve strategic distortions and misrepresentations of intentions and outcomes, adverse selection and moral hazard problems are introduced into exchange relationships. It is the possibility of opportunistic behavior where there is uncertainty, and only a small number of buyers and sellers, that information impactedness (information asymmetry that cannot be overcome at low cost) can occur. It is the potential opportunistic use of impacted information that subjects transactions to hazard and raises the question of appropriate organizational arrangements.

It is important to note that the degree to which the above factors are present is linked to the dimensions of the transactions involved in the exchange. Williamson (1979) identifies three critical dimensions of transactions: (1) the investment characteristic (the degree to which suppliers need to make investments in human and physical capital to realize production cost economies); (2) the extent of buyer activity

(frequency and volume); and (3) the degree of uncertainty and/or complexity that surrounds the transaction. Williamson argues that variations in these critical dimensions of transactions can affect both the relative economies of scale for internal production vs external purchase; and the level of transactions costs encountered under these alternative modes of organizing the transaction. In this context, a firm's decision to "make-or-buy" will be made so as to economize on the sum of production and transactions costs (Williamson, 1979, p. 254).

The effects of variations in the dimensions of transactions on economies of scale in internal production vs external purchase, and on contracting hazards associated with buying, will be discussed later in the paper. The point to be made here is that because intra-firm transfers of intermediate product represent transactions between subunits, the theoretical framework developed in the economics of internal organization can be used to consider contracting issues involved with these internal transfers and the transfer pricing process.

#### *Theoretical development by Watson & Baumler (1975)*

Watson & Baumler make two main contributions to the development of a theory of transfer pricing. Their first contribution comes from proposing that explicit attention be given to underlying organizational conditions (uncertainty, differentiation and integration) if we are to understand how the transfer pricing question arises and the process used in setting prices. Watson & Baumler (1975, pp. 466–467) point out that most authors provide reasons for decentralization when addressing the transfer pricing question; but

...none... has offered a coherent theory of decentralization. Consequently, the implications that the authors see of decentralization for transfer pricing are fairly restricted and pragmatic.

The theory of organizational decentralization which Watson & Baumler introduce was drawn from the contingency literature and, in particular, from the work of Lawrence & Lorsch (1967). Watson & Baumler consider the degree of un-



certainty, which is defined as contingent on technology and environment, as fundamental to the design of the firm's organizational structure and management accounting and control systems. Decentralization is viewed as a response to uncertainty which will, in turn, influence the attitudes and behavior of the members of the resulting segments of the firm. This process is referred to as differentiation. Following Lawrence & Lorsch, Watson & Baumler hypothesize that organizational success is dependent on two things: (1) requisite differentiation — i.e. each organizational subunit must be designed so as to cope effectively with the demands of its technology and environment; and (2) integration — i.e. the process of insuring that efforts of appropriately differentiated subunits are motivated to maximize overall firm goals. Integration is achieved through the use of a multidimensional process of conflict resolution.

Watson & Baumler's second contribution lies in their proposition that transfer prices play a dual role in the differentiation and integration of the decentralized firm. Transfer prices enhance differentiation by helping separate and pinpoint responsibility in different segments of a firm. Transfer prices also can help achieve the required integration when organizational components are strongly differentiated, yet highly interdependent. In these complex organizational situations, Watson & Baumler argue that transfer prices will be only one of a number of inputs to a multidimensional process of conflict resolution. In this process they believe that negotiation will play a central role — covering not only transfer prices, but also related items such as design and engineering changes, production and delivery schedules, and quality control.

### *Issues for elaboration and extension drawing on the economics of internal organization*

The economics of internal organization addresses a number of issues that are either not answered, or are insufficiently addressed, by Watson & Baumler.

First, the markets and hierarchies framework views uncertainty as only one of several interrelated factors which create the transaction costs that cause firms to differentiate and integrate. By considering other factors the OFF can provide a richer and more insightful explanation of the process of differentiation and integration and the role that transfer prices play in this process. The crucial role of process also has been emphasized by others. For example, based on the perspectives gained from four alternative, but complementary, organizational models, Swieringa & Waterhouse (1982, pp. 159–160) conclude that "... the process of devising pricing rules, procedures, and prices may be as important in achieving some degree of organizational control as the rules, procedures and prices themselves".<sup>5</sup> More recently, Eccles (1985) and Grabski (1986) have both commented on the importance of a consideration of process when studying transfer pricing.

Second, Watson & Baumler do not explicitly consider the possible relationship among strategy, structure, management control systems and the dimensions of intra-firm transactions between differentiated subunits. A firm's diversification strategy is of particular importance when trying to explain a firm's organization structure and its management accounting and control system choices<sup>6</sup> because it can affect not only the types of transactions organized in a particular firm, but also the extent to which a

<sup>5</sup> The markets and hierarchies approach is only one of four organizational perspectives used by Swieringa & Waterhouse (1982) to examine the transfer pricing question in the context of the Birch Paper Company case. The other models used were the behavioral model of Cyert & March (1963); the garbage can model of organizations (Cohen, March & Olsen, 1972; Cohen & March 1974); and the organizing model (Weick, 1969, 1979).

<sup>6</sup> Caves (1980) summarizes studies of the association between diversification strategy and organizational structure in the U.S.A., U.K., France and Italy over the ten-year time period 1950–1970. His collected data show that as the degree of diversification increases across firms, so too does the proportion of firms that have adopted a divisionalized organization structure.

firm chooses to decentralize its operations using profit centers.<sup>7</sup>

Some evidence that the extent of intra-firm transactions are associated with diversification strategy is reported by Umapathy in Vancil (1979). Using categories of diversification developed by Rumelt (single product, dominant product, diversified-related products and diversified-unrelated products), Umapathy found that less diversified firms have more transfers of goods between profit centers than firms with higher levels of diversification.<sup>8</sup> This is not a surprising finding: profit centers in firms diversified into unrelated businesses are more likely to be independent with few intra-firm transfers taking place. If such a firm structures itself along divisional lines, with a separate profit center for each product grouping, there will be few control problems arising from the need to coordinate intra-firm transactions. Performance measurement and evaluation will be straightforward and will focus on the independent contributions of each profit center to firm profits.

This is not the case in a vertically integrated single or dominant product firm (or even a related products firm) that adopts the increasingly common business strategy<sup>9</sup> of decentralizing its operations in a way that gives technologically separable processes profit center standing.<sup>10</sup> In these cases the organization and control issues (arising from OFF factors within the firm) are much different because of the different dimensions of transactions between profit centers. Typically, because of the interdependence between profit centers, intra-firm transactions in these firms will be frequent and at a material vol-

ume level, and will involve the supplying division in investments of human and/or physical capital directly related to the internal transfer. Whenever this involves the acquisition of special purpose assets, or labor skills that cannot be readily shifted to the production of other products with a ready external market, profit center managers who are evaluated solely on divisional profit performance, will have opportunities to behave opportunistically.

In summary, control problems of intra-firm transfers are hypothesized to be a function of the dimensions of intra-firm transactions which are, in turn, dependent on both the diversification strategy of the firm and its decentralization strategy, the latter being reflected in the firms' organizational design. Watson & Baumler do acknowledge that a firm's needs for differentiation and integration will vary with the degree of diversity and uncertainty faced by organizational subunits, but they do not relate this explicitly to the types of transactions handled by subunits. While a subunit is defined by its transactions, the reason to have the analysis focus on transactions — rather than the subunit — is because the transactional focus allows the analysis to clearly and explicitly consider the dimensions of the transactions between subunits; and their interrelationships with strategy, organizational structure, the nature of the firm's control problems, and the resulting demands placed on the firm's management accounting systems.

Finally, Watson & Baumler argue that transfer prices will most likely be negotiated as an aid to integration when profit centers are strongly differentiated and highly interdependent. But they

<sup>7</sup> Caves (1980, p. 87) writes: "In the MD [multi-divisional] organization, the fineness with which activities are divided among divisions is itself a policy variable — one that should be optimized jointly with the differentiation of those divisions and the integrating effort applied to coordinating, in order to maximize the value of a firm's strategy."

<sup>8</sup> Umapathy (in Vancil, 1979, p. 170) reports that among highly diversified firms it is unusual to find transfers of goods between profit centers accounting for more than 10% of the value of the profit centers' finished goods, yet among less diversified firms it is common.

<sup>9</sup> Vancil (1979, p. 20) refers to a firm's choice of how to compete within the lines of business that it chooses to enter as its business strategy. Business strategy is reflected in the firm's organizational design.

<sup>10</sup> The studies reviewed by Caves (1980, p.72) also show a clear trend over time towards the use of decentralized, divisionalized organizational structures in all diversification categories — including single and dominant product firms.

do not discuss the nature of these negotiations or, as Grabski (1986, p. 44) points out, potential covariates: the process of evaluation of managers and organization structure. One of the advantages of viewing the negotiating process from the contracting perspective of the OFF is that it allows questions to be asked about those aspects of internal transfers that subject the exchange to hazard. It also allows questions to be asked about: the role of corporate level managers in the arbitration of disputes; and the role of performance evaluation, promotion and other incentive mechanisms (within the context of the organizational structure of the firm) to control conflict and promote cooperation among sub-units.

The remainder of the paper builds on Watson & Baumler's work by drawing on the economics of internal organization to develop a more comprehensive theory of the transfer pricing process. Figure 1 provides a visual representation of some of the relationships discussed above and provides a basis for the ensuing discussion.

### THE CONTROL OF INTRA-FIRM TRANSFERS: THEORETICAL DEVELOPMENT

Firms have two decisions to make about intermediate products:

(1) A decision about the design features or specifications of the product. The chosen design will be a function of the firm's perceived market opportunities, competitive strategy and desire to differentiate its end products in the market. Intermediate products, therefore, may range from completely standardized components to highly specialized components with many unique design features.

(2) A decision to either "make-or-buy" the intermediate component. As noted in an earlier section, the decision to make-or-buy will be made so as to economize on the sum of production and transaction costs: the choice involves not only a consideration of the cost of making internally vs the cost of buying externally, but also the degree to which exchange hazards are associated with external procurement.

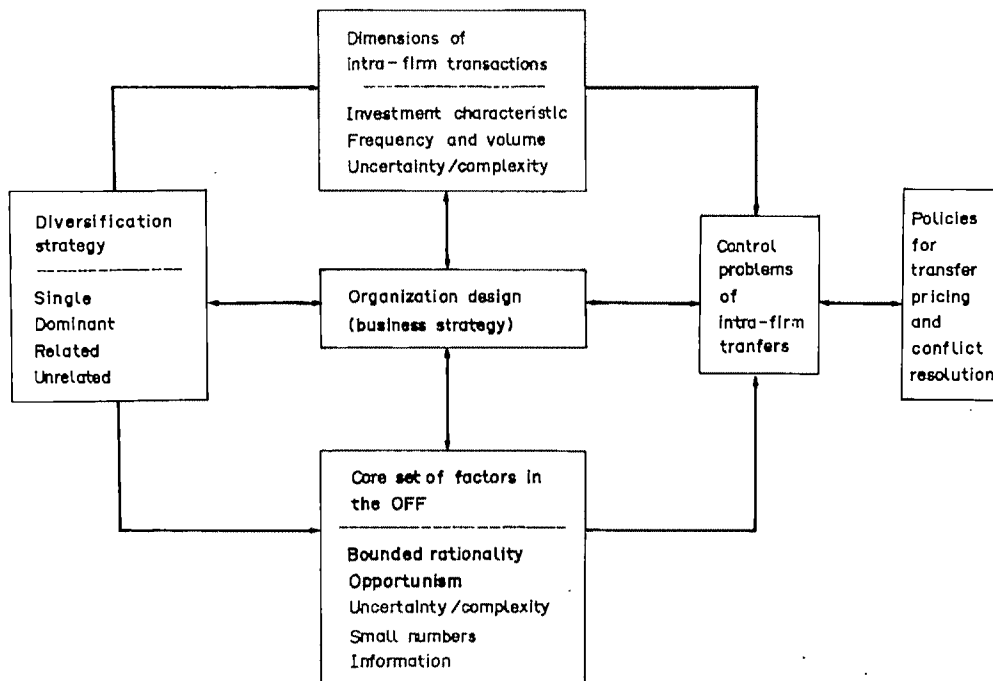


Fig. 1. Some major factors affecting control of inter-firm transfers.

Table 1 provides an overview of the relation between the dimensions of intermediate product transactions, and the production economies and exchange hazards associated with the make-or-buy decision.

The first three columns of Table 1 specify the dimensions of the intermediate product transactions using the categories identified by Williamson (1979). This is followed by two columns which characterize respectively: (1) the relative economies of scale from making the intermediate product internally, and (2) the contracting hazards that may be associated with buying. Some explanations, in terms of the dimensions of the transactions, are in order:

(1) *The investment characteristic.* This is defined as the degree to which transaction-specific investments in human or physical capital are required to realize production cost economies. The greater the need for special-purpose (as compared to general-purpose) plant and equipment, or labor with special skills, to produce the product which is the subject of the transaction,

the more likely it is that economies of scale can be captured by making internally. At the same time, exchange hazards associated with buying increase because the difficulties of shifting special-purpose, transaction-specific assets to other uses can create opportunities for opportunistic behavior. As can be seen from Table 1, the categories of product that are associated with the different levels of special-purpose, transaction-specific investment are referred to respectively as standardized, customized and idiosyncratic.

(2) *The extent (or frequency and volume) of buyer activity.* The greater the frequency and volume of the transaction involving the intermediate product, the greater is the likelihood that economies of scale can be captured by making internally, and the greater the possibility of being able to support a more elaborate organization structure and control system. When a transaction takes place only occasionally, it is not likely that economies of scale will accrue to manufacture within the firm. Even in those circumstances where occasional transactions re-

TABLE 1. Dimensions of transactions and effects on production economies and transaction costs

| Dimensions of transactions              |                         |                                 | Make                                                                                                                                    | Buy                                                        |
|-----------------------------------------|-------------------------|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Investment characteristic               | Frequency and volume    | Level of uncertainty/complexity | Relative economies of scale                                                                                                             | Contracting hazards (transaction costs assoc. with buying) |
| Non-specific (standardized product)     | Occasional to recurring | Low to high                     | Strongly favor buying externally                                                                                                        | Negligible                                                 |
| Semi-specific (customized product)      | Occasional              | Low to high                     | Strongly favor buying externally                                                                                                        | Low to moderate                                            |
|                                         | Recurring               | Low to intermediate             | Moderately favor buying externally                                                                                                      | Moderate to high                                           |
| Highly specific (idiosyncratic product) | Occasional              | High                            | Inherently difficult to organize. (Products either standardized and acquired in markets or made more idiosyncratic and made internally) |                                                            |
|                                         |                         | Low to high                     | Buying externally favored                                                                                                               | Moderate                                                   |
|                                         | Recurring               | Low to intermediate             | Economies of scale may be captured by making                                                                                            | High                                                       |
|                                         |                         | High                            | High probability of capturing economies of scale by making                                                                              | Extremely high                                             |

Source: Adapted from Williamson (1979) and Williamson & Ouchi (1980).

quire highly specific investments in human or physical capital, the occasional nature of the transaction generally will not support an elaborate governance structure. Means other than internalization of the transaction may be used to deal with the increased level of exchange hazard involved.

(3) *Uncertainty and complexity.* The effect of an increase in the uncertainty or complexity surrounding a transaction is to increase the probability that adaptations will be needed as the future is revealed. The result is that at low levels of uncertainty there are few contracting problems because contingent claims contracts are easy to write. As uncertainty increases (along with the degree of special-purpose, transaction-specific investment and the extent of buyer activity), the cost of writing contingent claim contract rises and rapidly becomes infeasible. For this reason, other (non-market) forms of organizing that allow the transaction to be readily adapted to changing circumstances by sequential decisions making will be favored.

Table 2 can be viewed as an extension of Table 1 and assumes that the intermediate product is made within the firm and transferred between

profit centers with separate profit streams. Its purpose is to provide an overview of the relationships among: (1) the dimensions of intra-firm transactions, (2) the extent to which internal contracting hazards can arise (and the resulting need for arbitration of disputes), and (3) the need for adaptation and cooperation between profit centers if overall firm interests in corporate profits are to be protected.

The following discussion provides a detailed look at the relationships (and their implications) in Table 1 and, in particular, Table 2. From this discussion nine propositions (hypotheses) are developed and then summarized in the final section of the paper. The first hypothesis deals with the relationship between diversification strategy, organization design and the dimensions of intra-firm transfers. Three hypotheses deal with the relationship between dimensions of intra-firm transfers and respectively: (1) the centralization of control over the make-or-buy decision, (2) the existence of well specified arbitration procedures, and (3) the choice of performance measures and incentives. Two further hypotheses deal with conditions for conflict over internal transfers and the areas of conflict

TABLE 2. Dimensions of intra-firm transactions, internal contracting hazards and the need for cooperation and adaption

| Dimensions of intra-firm transactions   |                         |                                 | Need for adaptability and cooperation between profit centers | Internal contracting hazards and need for arbitration of disputes |
|-----------------------------------------|-------------------------|---------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------|
| Investment characteristic               | Frequency and volume    | Level of uncertainty/complexity |                                                              |                                                                   |
| Non-specific (standardized product)     | Occasional to recurring | Low to high                     | Low                                                          | Negligible                                                        |
| Semi-specific (customized product)      | Occasional              | Low to high                     | Low to moderate                                              | Low to moderate                                                   |
|                                         | Recurring               | Low to intermediate High        | Moderate to high Moderate to very high                       | Moderate to high Moderate to very high                            |
| Highly specific (idiosyncratic product) | Occasional              | Low to high                     | Moderate to high                                             | Moderate                                                          |
|                                         | Recurring               | Low to intermediate High        | High High to very high                                       | High High to very high                                            |

between divisional managers. And finally, three hypotheses deal with the relationship between the dimensions of intra-firm transfers and the setting of transfer prices.

*Transactions involving standardized components*

*The make-or-buy decision with standardized components (Table 1).* Buyers and sellers face few contracting hazards in markets where standardized intermediate products are exchanged. The buyer is protected against possible opportunistic behavior of the supplier by the ease of turning to alternative sources of supply. The seller is similarly protected against possible opportunistic behavior of the buyer by the ease of selling to other buyers. Because hazards associated with buying a standardized component are minimal, there will be normally be few, if any, transaction cost economies associated with making the component. Economies of scale in production will accrue to those suppliers who aggregate buyer's demands to reach optimal capacity. Under these conditions, buying the component externally will usually be favored and there will typically be no economic incentive for the firm to make the component.<sup>11</sup>

*Internal transfers of standardized components (Table 2).* A firm that supplies a standardized intermediate product may also make internal transfers of components between subunits. If no transaction-specific investments in human or physical capital are associated with the internal transfer, then the need for adaptation and cooperation between the buying and selling units will be low. Internal transfers will be controlled by external market forces and will take place at market prices. The internal supplier is protected against the opportunistic behavior of the inter-

nal buyer by being able to sell externally; and the internal buyer is similarly protected by being able to turn to other sources of supply with relative ease. Top managers will not need to constrain the buy and sell decisions of subunit managers to protect the firm's overall economic interests.

An exception occurs when the economies of scale of the supplying division are critically dependent upon the volume of internal demand and there is uncertainty about the capacity of the external market to absorb the expected volume of internal transfers. In this case, the supplying division and the firm as a whole have a strong interest in continuing internal transfers of the standardized component.<sup>12</sup> The supplying division will seek a long-term internal contract to protect itself against potential opportunistic switching by the buying division, and the firm will have an incentive to ensure that the firm's overall economic interests in the continuing make-or-buy decision are considered. The use of arbitration mechanisms for resolving internal contractual disputes are discussed in the following subsection.

*Transactions involving components with specialized design or performance specifications*

*The make-or-buy decision for specially designed components (Table 1).* The firm has incentives to make rather than buy intermediate products which require substantial transaction-specific investment in specialized productive assets. Because of this needed investment there may be few production economies available to external producers that are not also available to the firm through internal manufacture. And the greater the frequency and volume of the internal demand for these components, the more likely it

<sup>11</sup> The exception is where the volume of the firm's internal demand is sufficiently high for the firm itself to capture economies of scale, or by aggregating internal and external demands. The decision is one that is based solely on economies of scale in production and does not involve transaction costs associated with exchange hazards.

<sup>12</sup> What needs emphasis here is that this assumes that the investment involved is specialized to the production of the standardized components in question and cannot be easily shifted to the production of other products. This is in contrast to general-purpose productive assets which can be readily shifted to other uses.

is that making will be preferred to buying. However, where the intermediate product is merely customized, and the needed transaction-specific investment in specialized assets is less, buying may still be favored on production cost grounds.

Investment by one of the firm's divisions in transaction-specific specialized assets also provides a transactional incentive for the firm to make (or continue to make) an idiosyncratic intermediate product. This is best seen by considering the situation where a firm enters into an arrangement with an external supplier for the regular supply of a component with unique specifications, the production of which requires investment by the supplier in assets specialized to its production. Under these conditions, the buyer and seller will typically negotiate a long-term contract. The seller, with few if any alternative uses for the transaction-specific, specialized assets, will seek to recover his investment plus some return; the buyer will want to be assured of a regular supply of components. In this setting, the contracting problem is how to adapt the relationship over time as future contingencies are revealed.

This is a problem that becomes more acute the greater the degree of uncertainty associated with the ongoing exchange. Where future uncertainties can be foreseen they can be negotiated into the contract. Generally, however, there will be a need for future adaptations of the original agreement to deal with unforeseen contingencies. And, because each party to the agreement appropriates a separate profit stream, there is always the possibility that *ex-post* adaptations proposed by one of the contracting parties may be at the expense of the other's profits. Therefore, when there is considerable uncertainty about future technologies and market conditions, and speedy and efficient adaptations to future contingencies are critical, making may be preferred to buying on transactional grounds. However, even when a decision is made to continue to buy the intermediate components because the level of uncertainty is less, the contracting parties will still seek means to make changes to the agreement over time in ways that do not disrupt the long-term relation-

ship. On this Williamson (1979, p. 251) writes:

What is needed. . . is some way for declaring admissible dimensions for adjustment, such that flexibility is provided under terms in which both parties have confidence. This can be accomplished partly by (1) recognizing that the hazards of opportunism vary with the type of adaptations proposed and (2) restricting adjustments to those where hazards are least. But the spirit within which adaptations are affected is equally important.

In markets, *ex-post* adaptations to contracts can only be made by mutual agreement of the parties to the contract. Proposed adaptations can be of two types: (1) quantity adjustments which involve proposals to adjust quantities or delivery times; and (2) price adjustments. Of the two types, proposed quantity adjustments are the least likely to involve opportunistic behavior because in these cases there is generally "... a presumption that the exogenous events, rather than strategic purposes, are responsible for quantity adjustments" Williamson (p. 251). The buyer is protected from the seller withholding supply and pursuing other opportunities because of the specialized investment that the seller has devoted to the recurring transaction. The seller is also protected to some extent against the buyer by the cost to the buyer of negotiating a new contract with another supplier.

Proposed price adjustments will not be as routinely accepted as quantity adjustments because, in Williamson's words, they can "... involve the risk that one's opposite is contriving to alter the terms of the bilateral trading gap to his advantage." However, different types of price adjustments vary in their degree of hazard and may still be agreed to by the parties. Generally speaking, only proposed adjustments that can be closely tied to exogenous, germane and easily verified events, involving quantifiable cost consequences, are likely to have a chance of mutual acceptance. For example, verifiable increases in direct material prices due to exogenous events may be readily agreed to or passed through according to some formula. Similarly, those involving the operation of crude escalator clauses tied to general economic conditions and negotiated as part of the initial contract may be permitted; crises which jeopardize the continuing relation-

ship also may result in *ad hoc* price relief. On the other hand, price adjustments which involve adjustments to changes in local conditions are likely to involve contracting hazards and are, therefore, likely to be rejected. Similarly, changes in overhead or other expenses that do not relate to readily verifiable events, or have clear-cut cost consequences, will not be passed through as readily because they involve the risk that one's trading partner is behaving in an opportunistic manner.

*Internal transfers of components with specialized designs (Table 2).* Where a firm is so organized that divisions can, or do, engage in internal transfers of customized or unique (idiosyncratic) components, the firm has a clear economic interest in subunit decisions to make-or-buy. The control question is: how to structure the relationship between self-interested (opportunistic), profit-seeking divisional managers in a way that protects the firm's economic interests? Treated as a contracting problem there are three main possibilities:

(1) Allow divisional managers full autonomy to negotiate their own arrangements to buy inside or outside the firm.

(2) Allow divisional managers to negotiate their own arrangements; but provide for intervention, as needed, by corporate managers to protect the firm's economic interests in the overall make-or-buy decision.

(3) Reorganize the firm in such a way that control over independent activities are placed, to the greatest possible extent, within the boundaries of a single division, under the control of a single manager.

Each of these possibilities is discussed in turn below and related to the dimensions of intra-firm transactions (i.e. degree of transaction-specific investment, frequency and volume, and uncertainty and/or complexity associated with the transaction).

#### *Allow full divisional autonomy*

To the extent that the measure of a divisional manager's performance is closely tied to divi-

sional profits; and managers have differential access to local information about production technologies, manufacturing costs, or outside market conditions which are not fully shared between them, then the same contracting hazards that arise in markets will arise with respect to internal transfers of components. As is the case in markets, after the initial agreement is reached, proposed quantity adjustments are not likely to lead to serious conflicts provided these adjustments do not seriously disrupt production schedules. (This possibility becomes more likely if the firm adopts "just-in-time" inventory systems.) Similarly, proposals for price adjustments resulting from external, verifiable events are not likely to cause major conflicts because there is a high probability that the external supply prices will also be affected. Other proposed price adjustments will not be so readily accepted and conflict is likely. Where these conflicts threaten the overall economic interests of the firm, it is unlikely that divisional managers will be totally free to buy or sell inside or outside the firm.

#### *Constrain divisional autonomy*

One way to protect the overall economic interests of the firm, yet retain a profit center structure and a measure of divisional autonomy, is through the introduction of a provision for arbitration into the negotiating process. Such a provision has a number of functions:

(1) *It provides an economical way to deal with the bounded rationality of corporate managers and for safeguarding internal transfers from opportunism.* Because corporate managers are boundedly rational, they have limited ability to become involved in the operating decisions of the divisions. However, where functional interdependence exists between profit centers (as will be the case when there are recurring transfers of intermediate products) corporate managers must guard against opportunistic behavior on the part of the division managers which is inimical to joint profits and, hence, the firm's interests. Provision for the arbitration of conflict between division managers, who are otherwise free to negotiate with each other, provides a means of freeing corporate



managers from over-involvement in day to day operations, yet provides for their involvement at critical times when the firm's economic interests are at stake.

(2) *It provides an economical way of overcoming information asymmetries in a firm decentralized into profit centers.* Contrary to the impression given in much of the literature on transfer pricing, conflicts over internal transfers or transfer prices can have a control purpose and are not necessarily dysfunctional. If properly managed, disputes can provide a means whereby corporate managers acquire critical, local information about internal transfers and their alternatives. Where arbitration of a dispute takes place, the arbitrator will receive information and analyses from both division managers in support of their positions. Eccles (1983, p. 158), for example, in his study of the transfer pricing process concludes that when conflict occurs:

... unit managers are likely to present information on roughly comparable external transactions or bids, differences in the cost of products sold externally, lack of cooperation in the relationship (poor R & D and service support or short lead times and canceled orders) inadequate and inflated gross margins and so forth.

In short, extensive local information will be presented to the arbitrator who, presumably, will have incentives to adjudicate the dispute with the overall interests of the firm in mind. The transfer pricing and arbitration process then are means of generating information necessary for the control of interdependent activities in a way that can achieve corporate objectives. The arbitration process itself, however, is subject to hazard as divisional managers have an incentive to systematically bias information presented to arbitration in their own self interests. However, relative to external arbitrators who may be called upon to arbitrate external contractual disputes, internal arbitrators will typically have a good working knowledge of internal operations, the performance histories of operating managers and, perhaps most important, strong powers of internal audit. Combined with a corporate manager's powers to terminate or revise contracts and adjust rewards, these powers will, in most

cases, be sufficient to detect and control the biased reporting of information. In addition, each division manager in presenting his case to the arbitrator, will have incentives to reveal biased representations of other divisional managers in the arbitration process.

(3) *It ensures that the firm's overall economic interests in the make-or-buy decision are taken into account.* When internal transfers of intermediate products involve investments by the supplying division in transaction-specific assets, conflicts are most likely to arise when: (a) the buying division wishes to switch to an external source of supply, or (b) changes in transfer prices are proposed which cannot be directly tied to exogenous, germane and easily verified events with quantifiable cost consequences. In both cases, the proposed change can affect the profitability and self-interest of one of the divisions. Arbitration of the conflict can be used to protect the firm's interest in the outcome. Consider a dispute involving a buying division wishing to switch from internal to external purchase of a frequently used component because of a proposed change in a transfer price that is not tied directly to an exogenous event. One obvious alternative is for the internal arbitrator to require that the buying division continue to purchase inside, but at outside market prices. While this solution is only really feasible where the intermediate component is not so unique that it is impossible to obtain a realistic market price or outside bid, it does have the following advantages: (a) the outside price protects the buying division from the opportunistic behavior of an inside supplier with a captive buyer; (b) the requirement on the buying division to buy internally allows the supplying division (and hence the firm) to recover its investment in specialized productive assets which have few, if any, other uses; and (c) the outside price forces the supplying division to operate efficiently because it is subjected to the outside pressure of the market place transmitted through a market-based transfer price. The other option is for the arbitrator to allow the buying division to purchase the component externally. As this will involve the supplying division (and the firm) in opportunity

losses associated with shifting specialized investments to purposes other than those for which they were originally intended, it is important that the economics of the decision be monitored from the firm's perspective.<sup>13</sup>

### *Reorganize the firm*

Conflict and disputes over internal transfers and transfer prices can also be a signal that the present organization structure is not conducive to organizational efficiency. Consider the situation where frequently recurring, inter-divisional transfers involve significant transaction-specific investment in human or physical capital and involve a high degree of uncertainty and/or complexity. Under these conditions, the need for cooperation and adaptation between division managers with respect to these internal transactions is critical. Egregious conflicts arising from the process of internal transfers may be a strong indication that the decentralization of interdependent activities within profit centers should be reexamined. The choices open are either to realign the organization structure in a way that eliminates, or at least reduces, the volume of these types of transfers between divisions (for example, by placing the control of the interdependent activity under the control of a single division), or to treat the supplying division as a cost center subject to strong centralized control through budgets.

### HYPOTHESES ABOUT INTRA-FIRM TRANSFERS, CONFLICT RESOLUTION AND THE TRANSFER PRICING PROCESS

This third section of the paper pulls together the prior theoretical discussion by presenting nine interrelated propositions (hypotheses) together with a brief review of the reasoning supporting each hypothesis. Hypotheses 1 is a general hypothesis relating to the relationship between diversification strategy, organization design and the dimensions of intra-firm transfers.

Hypotheses 2, 3 and 4 relate to various aspects of the process of control of intra-firm transfers; Hypotheses 5a and 5b deal with conflict over internal transfers; and Hypotheses 6a, 6b and 6c deal with the setting of transfer prices.

The dimensions of transactions referred to in the following hypotheses can be seen in Table 2 they are: the degree of transaction-specific investment, the frequency and volume with which the transaction (transfer) takes place, and the uncertainty and/or complexity which surrounds the transaction.

### *Hypothesis 1. Strategy, structure and the dimensions of intra-firm transfers*

The dimensions of intra-firm transfers of intermediate product are jointly related to a firm's diversification strategy, its product design and its organization structure.

Diversification strategy and product design determine the types of transactions entered into by firms. Organization structure determines how the firm will divide these transactions or activities among operating subunits. Holding other things constant, firms with higher levels of diversification are likely to have lower volumes of intra-firm transfers than are firms with lower levels of diversification. Similarly, how a firm arranges its organization structure to decentralize its activities will affect the dimensions of transactions taking place across subunit boundaries.

### *Hypothesis 2. Centralized control of the make-or-buy decision*

The greater: (1) the degree of transaction-specific investment, (2) the frequency and volume, and (3) the degree of uncertainty and/or complexity associated with intra-firm transactions, the stronger will be the firm's interests in centrally controlling the make-or-buy decision.

Where close coordination and rapid adaptation of intermediate product transactions are critical to overall firm profitability, corporate

<sup>13</sup> Important elements of a firm's vertical integration strategy can be involved in this decision. For an excellent strategic analysis of vertical integration see Porter (1980).

managers will centralize the decision to buy or sell inside or outside the firm either: (1) by making the decision themselves, or (2) by placing intermediate product transaction completely within the boundaries of one division. Where the frequency and volume, degree of transaction-specific investment, and uncertainty and/or complexity are less extreme, other options are possible.

*Hypothesis 3. Existence of arbitration procedures*

The greater: (1) the degree of transaction-specific investment, (2) the frequency and volume, and (3) the degree of uncertainty and/or complexity associated with intra-firm transactions, the more likely it is that the firm will have well specified arbitration procedures to safeguard the firm's interest in the make-or-buy decision.

When an intra-firm transfer takes place only occasionally, it is unlikely that the firm will have well developed arbitration procedures. Disputes between divisional managers which cannot be settled by managers themselves will be dealt with on an *ad hoc* basis by more senior corporate managers. However, when intra-firm transfers are recurrent and material in volume, the need for divisions to work things out in a way that is not inimical to the firm's economic interests becomes important. As the degree of transaction-specific investment and uncertainty also increases, there will be increasing pressure for a well specified arbitration procedure to overcome information asymmetries and to promote coordination and adaptation between divisions in a way that does not damage the economic interests of the firm.

*Hypothesis 4. Performance measurement and incentives*

The greater: (1) the degree of transaction-specific investment, (2) the frequency and volume, and (3) the degree of uncertainty and/or complexity associated with intra-firm transactions, the more likely it is that the firm will de-emphasize performance measurement and in-

centive mechanisms that focus entirely on divisional profitability, in favor of broader measures and incentives that recognize the need for cooperation and adaptation.

When intra-firm transfers of intermediate product do not require transaction-specific investment in productive assets, when they are infrequent and do not involve a high level of uncertainty and/or complexity, then performance measurement based on divisional profitability will be emphasised. In these cases, there is little need for close coordination or rapid adaptation to changing circumstances so divisional managers can be evaluated and rewarded as if their divisions are independent entities. On the other hand, when divisions are highly interdependent due to frequent transfers of intermediate products, extensive transaction-specific investment, and/or a high degree of uncertainty and/or complexity, performance evaluations will tend to de-emphasize measurements that focus entirely on divisional profitability, in favor of broader measures that recognize the need for broad-scale cooperation and adaptation between divisions.

To the extent that rewards of divisional managers are tied to joint (firm) profits, the greater will be the incentive for division managers to cooperate and adapt their separate operations to changing market conditions, and technologies. Also, to the extent that performance measurement, evaluation and incentive mechanisms can be used to motivate cooperative, adaptive behavior on the part of divisional managers, the pressure on centralized control mechanisms (such as arbitration procedures) will be reduced.

*Hypothesis 5. Conflict*

There are two hypotheses regarding conflict: the first specifies the general conditions under which conflict is most likely to occur; the second specifies which proposed adaptations are likely to cause the greatest conflict.

*Hypothesis 5a.* The greater: (1) the degree of transaction-specific investment, (2) the fre-

quency and volume, and (3) the degree of uncertainty and/or complexity associated with intra-firm transactions, the more likely is conflict between divisional managers involved in internal transfers of intermediate products.

This hypothesis is a corollary of Hypothesis 4 on performance measures and incentives. If performance measures and incentive mechanisms focus entirely on divisional profitability, then conflict is most likely under the conditions specified in Hypothesis 5a. To the extent that this likelihood for conflict is recognized and divisional manager's rewards are tied to performance measures that promote cooperation and adaptation (for example, measures of corporate profits), conflict will be mitigated.

*Hypothesis 5b.* Conflict between divisions involved in intra-firm transfers of intermediate product is more likely for *ex-post* proposals for transfer price adjustments than it is for *ex-post* proposals for quantity adjustments.

These two types of proposed adaptations pose different degrees of hazards of opportunistic behavior: *ex-post* proposals for transfer price adjustments, because of their zero-sum quality will not be as readily accepted as *ex-post* proposals for quantity adjustments. However, not all *ex-post* proposals for transfer price adjustments will necessarily result in conflict. Where proposed transfer price adjustments involve quantifiable cost consequences which are closely tied to exogenous, relevant and easily verifiable events, they may be accepted without conflict. On the other hand, if the proposed price adjustments cannot be directly attributed to exogenous events, or these events do not have readily quantifiable and verifiable cost consequences, they will not be as readily accepted and conflict over the adjustment is a likely outcome.

#### *Hypothesis 6. Transfer pricing policies*

Transfer pricing policies may vary throughout the firm because they are related to the dimensions of intra-firm transactions between specific subunits.

From the limited number of empirical studies that have been made of actual transfer pricing policies, it is known that a range of transfer pricing rules are used by firms; but explanations of why variations exist have been lacking.<sup>14</sup> The general hypothesis given above can be broken down into three, more detailed, subsidiary hypotheses.

*Hypothesis 6a.* Where standardized intermediate products are the subject of the transfer, or the transfer involves products for which the degree of customization is minor, market prices will be the primary basis for setting internal transfer prices and for profit center managers choosing between internal and external suppliers and customers.

From a contracting perspective, there is no transfer pricing problem associated with intra-firm transfers of a standardized intermediate product. Transfers will usually be negotiated by profit center managers at market prices, with adjustments confined to such things as volume discounts and differences in terms of sale and delivery. The decision to buy or sell components inside or outside the firm will be left to the subunit managers allowing the firm's interests to be safeguarded by market forces.

Where the degree of customization of the intermediate product is minor, and the extent of transaction-specific investment in human or physical capital is small, market prices of similar products will still act as an initial basis for establishing a transfer price. It is expected that adjustments to market prices for the costs of customi-

<sup>14</sup> Commenting on the results of his extensive study of the management processes of 296 decentralized companies, Vancil (1979, p. 142) notes that he was disappointed when he was unable to arrive at any definitive conclusions on transfer pricing. He writes: "To my knowledge, our data are the only empirical data ever gathered on the topic, and we had plenty of other data to help explain the variations in practice that we found. But no pay dirt, only a dry hole. The issue remains as a perennial puzzle to academicians, while practitioners continue to cope. I wish the best of good fortune to the next researcher to tackle the problem."

zation will typically be negotiated by divisional managers. While there is some potential for haggling, firm interests are still well protected by market forces, so that any intervention by corporate managers will be minor; perhaps taking the form of a simple policy requiring that internal suppliers be given the opportunity to meet external bids.<sup>15</sup>

**Hypothesis 6b.** Where the internally transferred intermediate product involves a moderate degree of customization and a material transaction-specific investment, internal manufacturing costs will play a greater role in the initial negotiations to set transfer prices and in *ex-post* proposals to adjust them.

Where a more extensive investment in transaction-specific assets is involved, the firm has a greater need to protect its economic interests in the decision making process and to ensure that adaptations to uncertain market and technologi-

cal opportunities and constraints are made as efficiently as possible.<sup>16</sup> With profit center managers having differential access to local information about manufacturing costs and markets, a bargaining process that makes use of cost-plus pricing and competitive bids or other market information to bound transfer prices can be expected. Because of the firm's heightened economic interests in the outcome of the make-or-buy decision, an arbitration mechanism is likely to be introduced into the process. An important function of such an arbitration mechanism is to overcome information asymmetries between profit centers. Negotiations, conflict and arbitration, therefore, provide, within limits, a cost-effective way of dealing with information impactedness within the firm.<sup>17</sup> The process is diagrammed in Fig. 2.

**Hypothesis 6c.** Where the internally transferred intermediate product is idiosyncratic, and involves a large investment in transaction-

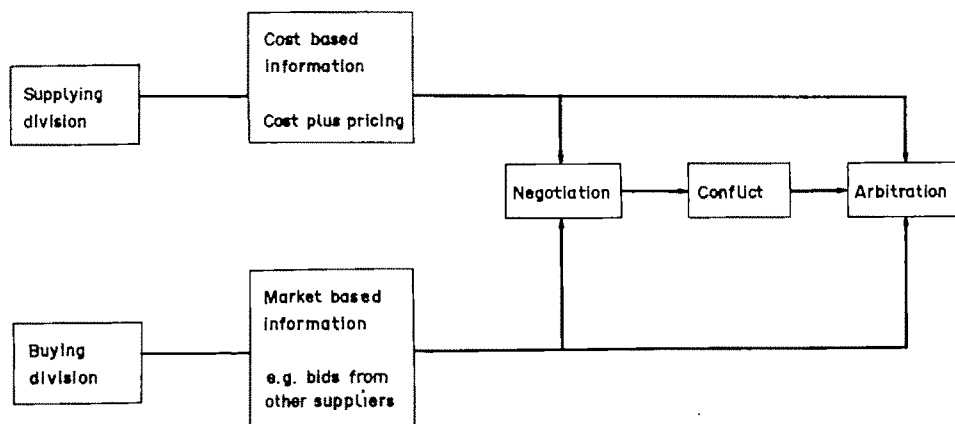
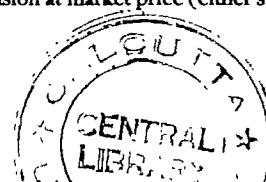


Fig. 2. Process of negotiation, conflict and arbitration.

<sup>15</sup> An exception can arise when the economies of scale of the supplying division are critically dependent on the frequency and volume of internal demand, and there is uncertainty about whether the external market is sufficiently large to absorb the current volume of transfers between profit center at the prevailing market price.

<sup>16</sup> If proprietary processes, technology or other trade secrets are involved in the manufacture of a component, and these must be shared with the supplier, the hazards of outside purchase are clearly increased.

<sup>17</sup> There are a number of possible outcomes of arbitration under these conditions. One is to require internal purchase of the needed component but allow the buying division to buy at cost, yet credit the selling division at market price (either simulated as a cost-plus price or on the basis of actual bids received).



specific human and/or physical capital, internal manufacturing costs will be the primary basis for setting transfer prices; and there will be strong central control over the make-or-buy decision. Whether internal transfers are made at simulated market prices (cost-plus), or simply at some measure of cost, is a function of the degree of uncertainty associated with the intermediate product and the control strategy adopted by the firm.

Because of the specialized nature of the production process, it is unlikely that idiosyncratic intermediate products made internally will have external market prices. Where uncertainty and/or complexity is not great, and the need for adaptations over time only moderate, the firm may continue to use a decentralized, profit center structure, combined with a negotiation-arbitration process, to set cost-plus transfer prices and control the flow of intermediate product between profit centers.

Where uncertainty is greater and the need for rapid adaptation to uncertainty more critical, conflicts between profit center managers are more likely. In these circumstances, corporate managers can be expected to decentralize the decision making process in two ways: (1) by placing the control of the interdependent activity under the control of a single division, or (2) by simply designating the supplying division as a cost center and mandating internal transfers of the intermediate product.<sup>18</sup>

#### SUMMARY, CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

While the literature on transfer pricing is replete with economic and mathematical programming models for setting transfer prices to meet some objective of the model, there have been few attempts, apart from Watson & Baumler (1975), to develop a theory of the

transfer pricing process which could be used to help explain observed transfer pricing policies and practices. Drawing on the growing literature on the economics of internal organization, this paper develops a theory of the transfer pricing process and presents a number of hypotheses based on the theory relating to internal transfers of intermediate products. The basic premise of this theory is that it is variations in a firm's strategic, organizational and transactional circumstances that explain a firm's choices of transfer pricing mechanisms and policies.

Some evidence bearing in the hypotheses presented above has been recently provided by Eccles (1985) based on extensive interviews with managers involved in transfer pricing in thirteen firms in three industries: chemicals, electronics and heavy machinery. Based on inductive reasoning from his observations, Eccles develops a series of conclusions and inferences that he refers to as a theory for practice. These conclusions and inferences can reasonably be viewed as a source of potential support for, or contradiction of, the propositions presented above. For the most part, Eccles' observations and the conclusions he draws from them, support the hypotheses developed here from theory.

What must be done now is to empirically investigate the setting of transfer pricing policies in practice in a way that allows for the testing of hypotheses developed in this paper. This empirical work should include: (1) an investigation of the link between diversification strategy, organizational design and the dimensions of intra-firm transactions; and (2) an investigation into the relations between the dimensions of transfers between specific selling and buying centers within a firm, and observed transfer pricing processes and practices. That is, the investigation should start by looking at how the firm's various strategies affect the dimensions of transfers between specific buying and selling centers throughout the organization; and then, having

<sup>18</sup> In this case, variable cost may be used as the transfer price if production volume is determined by the subunit managers. Full cost might be used if the production volume is determined centrally. In the latter case, conflict is more likely if inefficiencies can be passed along in the cost price.

done this, investigate how control problems and transfer prices differ among them. On *a priori* grounds it seems useful to distinguish between these two parts of the investigation because, in large companies, different strategies may apply to different parts of the firm. For example, a firm may be vertically integrated within divisional groupings but diversified between groups. Focussing on the dimensions of transactions between specific buying and selling units (whether

these units are at, or below the group level) allows the investigation to focus on different control issues in different parts of the firm.

The objective of this empirical work in the field should be to determine if practice is consistent with the hypotheses advanced in this paper and to lead, eventually, with additional theoretical work, to a genuine organizational theory of transfer pricing.

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## OBITUARY

IN MEMORY OF LOUIS R. PONDY  
9 MARCH 1938 — 16 JULY 1987



Louis R. Pondy

Faced by the untimely passing of Lou Pondy, our original intentions were to comment on his contribution to our knowledge of organizations. It became apparent, however, that Lou, the person, and his ideas were inextricably intertwined. This may be typical of scholars who see their area of scholarship to be the study of human affairs. Our reflections on Lou Pondy, therefore, were driven by both the personal and intellectual presence of Lou as a scholar.

Lou Pondy began having severe back pains in late 1986 and in early 1987 he was diagnosed as being terminally ill with cancer. He was about to enter a new and exciting period of intellectual growth when the disease overcame him. He was stepping down after five years as Head of the Department of Business Administration at the University of Illinois at Urbana-Champaign, and was about to take a Chaired Professorship at Wharton. Those circumstances, especially in light of

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A scholarship fund for the graduate students who gave him such joy has been established in honour of Louis R. Pondy. Contributions can be made to: The Director of Development, College of Commerce and Business Administration, University of Illinois at Urbana-Champaign, 1206 South Sixth Street, Champaign, IL 61820, U.S.A.

his major contributions to organizational studies, make his death a tragic loss to the community of scholars. But for those who knew Lou, the loss was not measured by his accomplishments or circumstances. Lou Pondy was a very remarkable person who brought a spirit and power to the act of human inquiry that is in a real sense irreplaceable.

You did not have to be a good friend of Lou's to know him well. He was open, accessible and outspoken in the nicest sense of that word. Anyone who attended a conference or seminar that he attended or a class he taught, met him at a party or over coffee or even on a plane felt they knew him. They experienced his warmth and humor, his special concern for nurturing young scholars, his incredible inventiveness, his contagious energy and his deep, genuine love of ideas.

We have much to learn from the spirit of inquiry that dominated Lou's life. In this time when tired, positivist images of science are paraded as ideals for young scholars to emulate, we need to remember the spirit of inquiry and sense of human struggle with ideas that Lou embodied. To be with Lou in a brain-storming session was exhausting. To see him at work in a seminar, linking disparate ideas into a new theory of organizational process was to see creativity at its best. A favourite story about Lou which typified his view of the world of ideas is his response to a student who, after a creative session of idea-making, asked "Is it true?" "If it isn't, it should be," Lou replied. "It's such a beautiful idea."

His work and his life were marked by a constant questioning. He was always eager to put the ideas he held most dear to the severest test. He worried that perhaps everything he had done up to that point was wrong, and was not afraid to reject a position to which he had been committed if it were shown to be wrong. He demanded that every act or instance be made to speak of general theories, and conversely, that any theory be able to speak to concrete situations.

In his life he studied and researched in a broad range of disciplines. His B.Sc. was in physics, and his Ph.D. was in organization behavior. He did

formal, post-doctoral study in game theory, operations research, philosophy and anthropology. This diversity of intellectual origins was reflected in his work. His research included the theory of organizational conflict, the process of budgeting and resource allocation, the theory of organization design, the implementation of management science, the evaluation of public policy, and the phenomenology of leadership and decision making. He searched for knowledge with as great a variety of methods as possible, and he explored a full spectrum of quantitative and qualitative approaches.

As he shifted paradigms and areas of interest, he broke new ground. For example, his early work on budgeting and resource allocation was among the first to link accounting and organization theory. His work on organizational conflict would define the field. In both of these areas he explicitly set the criteria for empirical tests of theory-based models that would guide those who followed. His work on methods of inquiry still inspires the structure of organizational research today.

His later work on language and symbolism introduced themes of Wittgenstein, Geertz and Bateson to the accounting and organizational literature. It marked the beginning of a serious turn by him toward interpretive, phenomenological work in both disciplines. At the end of his life he was coming full-circle and beginning projects to model and simulate corporate bankruptcy, to develop a new theory of organizational conflict, and to develop agency theory beyond the formulation of optimal incentive structures.

It is often the case that a true scholar such as Lou does not have an easy life. The sense of anguish and uncertainty that stimulates research can also penetrate deep into the psyche. It creates a searching, probing and challenging attitude to ideas both new and old. This may explain the diversity of themes in Lou's research and his habit of re-visiting earlier themes to improve, revise or even overturn them!

He saw ideas for research everywhere. Even as the disease ran its course, it stimulated him to think in terms of its implication for the study of

organizations. The loss of calcium from the bones when there was a lack of skeletal stress caused him to speculate on the role and importance of stress and conflict in maintaining organizational stability.

To those who knew him it is important to note that he died as he had lived — with great courage and dignity. Those who desire to learn from Lou should not only study his works, but also his special approach to work. His deep sense of humility, his concern for and constant questioning of the significance of his ideas, his openness to new

lines of thought and new areas of inquiry, his challenge to our taken-for-granted ways of thinking, and his love of creative scholarship.

Rather than integrate Lou's work into our reflections or include a series of citations at the appropriate points, we have appended a bibliography selected from his numerous works. These we feel highlight his ideas better than we can abstract them. We commend them to you.

JACOB G. BIRNBERG  
RICHARD J. BOLAND

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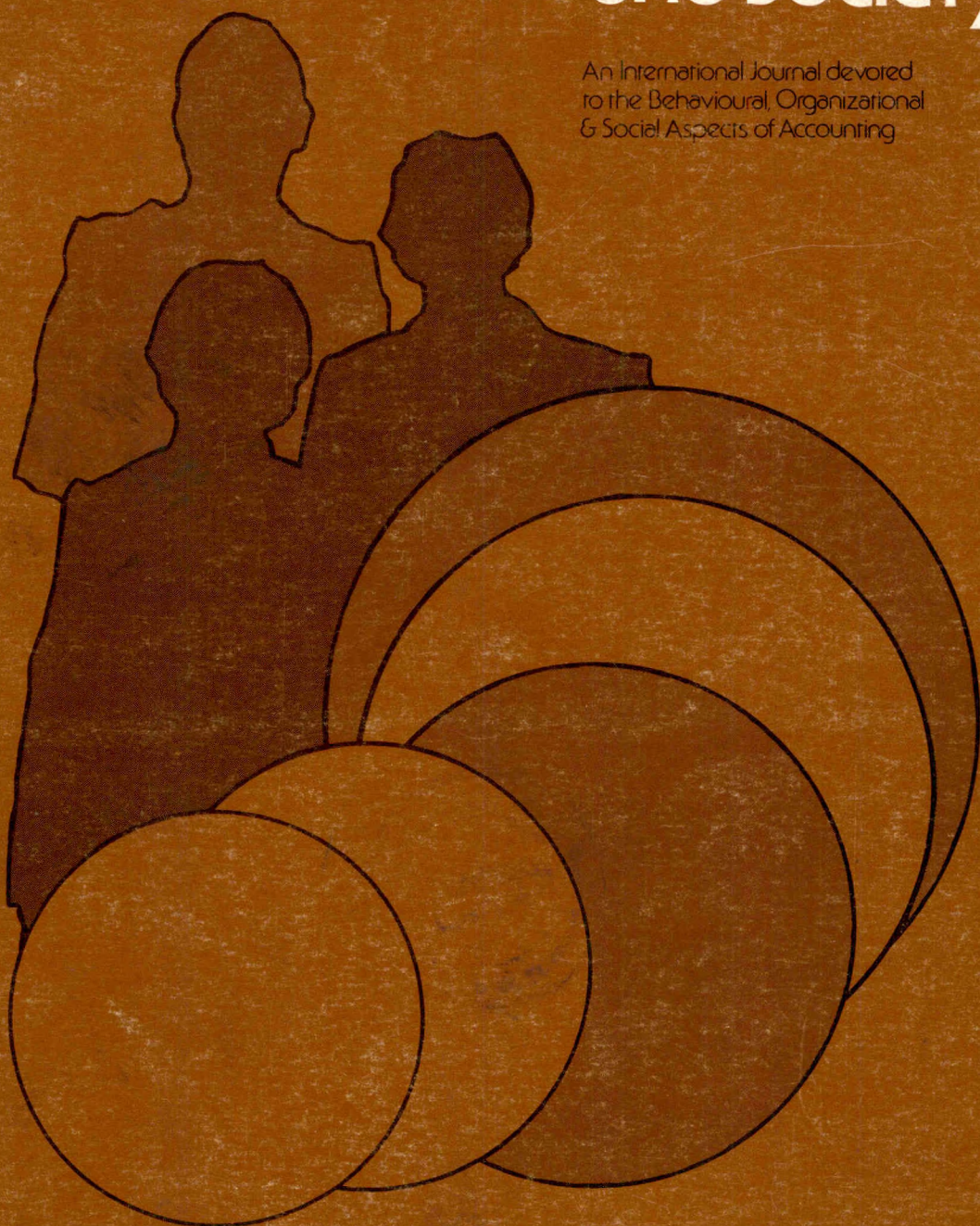
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## ON ORIGINS AND DEVELOPMENT: SOME REFLECTIONS ON THE 40TH ANNIVERSARY OF PERGAMON PRESS AND THE 65TH BIRTHDAY OF ITS FOUNDER, ROBERT MAXWELL

ANTHONY G. HOPWOOD

*London School of Economics and Political Science*

*Accounting, Organizations and Society* was born amidst a consideration of some of the very circumstances which it sought to study and understand. Recognising that Pergamon Press provided a fascinating example of the ways in which accounting practice in the United Kingdom became involved with wider patterns of institutional, economic and social development, I and other colleagues at the Manchester Business School had organized a role-playing case study based around this important incident in recent British accounting history. As part of this educational project we had placed quite a lot of emphasis on bringing in significant actors in the actual event to meet with students, enabling them thereby to push their questioning and analysis further than would be allowed by a study of only press cuttings, professional pronouncements and governmental inquiries. It was in such an educational context that I first met Robert Maxwell.

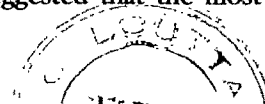
That meeting provided an opportunity for more general discussions. In the midst of these Robert Maxwell, ever the publishing entrepreneur, asked whether I had any ideas for new journals. Well, as it happened, I had been thinking of just that subject myself! Like others, I had become increasingly aware of a gap between what I saw to be the potential for a behavioural, organizational and social appreciation of accounting systems and the editorial preferences and policies of existing journals. A discussion of these difficulties and the possibilities they offered for a *new* journal provided the basis for the subsequent discussions between Robert Maxwell, his editorial colleagues and myself, out

of which emerged the idea for a new journal.

The facilitative but entrepreneurial style of Pergamon Press had ample opportunities to demonstrate itself in the hectic months of effort which resulted in the transformation of that embryonic idea into a more substantive and fully fledged proposal for an actual journal. I quite quickly started to realise the enormity of the task that I had entered into. Having the idea was easy, but a novice editor was now confronted with launching the venture, recruiting the Editorial Board, articulating a more detailed statement of editorial aims, sounding out the availability of manuscripts, and establishing the basis for a respected review process. The task was all the greater because the journal had not been established to publish a body of existing work. It had been founded quite consciously to provide a basis for forging a new mode of accounting research. A more proactive agenda was implicit in its birth. As the first editorial statement concluded:

The fact that researchers and practitioners now have a specialized forum for the publication of material on the behavioral and social aspects of accounting is indicative of an emerging maturing and significance. But more fundamental and exciting developments undoubtedly lie ahead. In stimulating these enquiries, reporting on the emerging perspectives, discoveries and the inevitable frustrations and disappointments, and helping to bring them all to the attention of a wider audience, *Accounting, Organizations and Society* has a challenging and valuable role to play.

Perhaps such aspirations help to explain why even agreeing on the title of the new journal proved to be so difficult. So much of the early advice suggested that the most appropriate one





was the *Journal of Behavioral and Social Accounting*. That title seemed so obvious to so many. But not to me! Even then I was worried about the certainty of the ways of characterising the fields of study that were implicit in such a title. I wanted one that would introduce a little more equivocality into prevailing notions of knowledge and, that by explicitly reflecting the fact that the journal sought to introduce new understandings of the linkages between accounting, the organizational and the social, would itself offer a challenge to those who sought to understand accounting action. Indeed such aims were reflected in the way in which accounting was conceived on the very first page of the first issue:

The purposes, processes and techniques of accounting, its human, organizational and social roles, and the ways in which the resulting information is used have never been static. The economic distinctions drawn by accountants and the methods which they use are themselves creations of the human intellect and reflect social as well as economic evaluations. They have evolved, and continue to evolve, in relation to changes in the economic, social, technological and political environments of organizations.

On this matter the staff of Pergamon Press let the new editor have his way. I think that the passage of time has proved the worth of the equivocality and openness of the title, however unusual it might have appeared initially.

The support of Pergamon Press was more crucial at a later stage. The initial support generated by the journal resulted in a good supply of manuscripts for the early issues. But all journals eventually have to stand on their own feet. And almost invariably that comes after the goodwill has been tapped as much as it can be but before the journal has established a sufficient reputation for itself to attract significant manuscripts from the younger and more active researchers. Understandably young academics looking ahead to tenure and promotion decisions adopt a cautious attitude to new journals. The gap that creates in submission results in difficult and, for the editor, a worrying stage in the development of a journal.

*Accounting, Organizations and Society* faced that problem in its third and fourth years. Issues

were thin, late and sometimes combined. Both I and the publishers were all too well aware of the fact that the journal might or might not survive to deal with the challenging agenda that it had laid down for itself. Faced with such obvious difficulties, I thought I only had two options. Either I could make the problem more widely known and appeal for help or I could sit back and hope. I thought that there was a very real possibility that the first option would result in a self-fulfilling prophesy. People would simply not want to publish in such a journal. So I stayed quiet, and hoped. I don't think anyone else knew how near to disaster *Accounting, Organizations and Society* was at that time.

It was at this stage that the advantages of working with a large experienced and sympathetic publisher became very clear. The staff of Pergamon Press knew their business, were well aware of the developmental stages that journals go through and trusted their editors.

As this very comment itself testifies, *Accounting, Organizations and Society* not only survived but developed and grew. I think that the journal is widely respected as a legitimate, creative and international forum for the publication of accounting research.

Over the years *Accounting, Organizations and Society* has placed particular emphasis on a number of themes. Perhaps more than any other accounting research journal it has sought to be international in scope. The journal now provided a platform where Americans, Europeans and Australasians debate issues and share perspectives. And, as recent issues demonstrate, the circle of authors still increases. The journal has also sought to provide a basis for a truly interdisciplinary study of accounting. As the title suggests, the aim has always been and will continue to be the study and understanding of accounting as a significant organizational and social phenomenon. Rather than placing a priority on particular schools of thought, particular methodologies and particular conceptions of what accounting is or is not, *Accounting, Organizations and Society* has provided a more open forum for shifting interpretations of the accounting art. It never has had a list of forbid-

den topics or modes of analysis, nor will it. Rather than reflecting on what accounting research should not be, it has tried to advance a more positive and experimental stance, striving, thereby to provide a basis on which accounting research might more creatively become what it is not.

For a journal which has only just entered its teenage years the record of achievement is not a bad one, even though much more development undoubtedly lies ahead.

Perhaps like others entering their teenage years, *Accounting, Organizations and Society* often adopts a self-reflective stance. On this occasion this is no bad thing. It enables the editor, the members of his editorial board, the authors past and present, and the readers to recognise the particular contribution which Pergamon Press and its founder, Robert Maxwell, has made to accounting learning and scholarship. From us all, happy 40th and 65th birthdays.

## THE RHETORIC AND REALITY OF AN ACCOUNTING CHANGE: A STUDY OF RESOURCE ALLOCATION

JANINE NAHAPIET  
*Templeton College, Oxford*

### Abstract

This paper presents a case study of health service resource allocation as a basis for exploring how organizational members come to understand the meanings and implications of accounting change within the enterprise. The analysis describes how the significance of a new calculative process emerges over time, during which accounting both shapes and is in turn shaped by organizational reality. The paper concludes with a discussion of the interplay between the rhetoric and reality of accounting, reviewing the ways in which, as an expressive order, accounting provides a language for discourse, rules for guiding action and a way of establishing legitimacy in an institutionalised organization.

Accounting has come to occupy an increasingly important position in the functioning of modern industrial societies, operating as an influential mechanism for economic management at the levels of the firm and of society (Burchell *et al.*, 1980; Earl, 1983). Comprising a system of symbolic classifications, accounting describes and makes sense of the world through an established, if developing, set of calculative practices and procedures.

The purposes served by such calculations have been considered in detail, both within the accounting profession and more broadly. For example, in a recent analysis of accounting theory, four principal images were identified as shaping financial accounting processes. These treat accounting as a historical record, as a descriptor of current economic reality, as an information system and as a commodity (Davis *et al.*, 1982). In management accounting, such images are closely coupled to models of organization. Here, accounting has been regarded primarily as a representation and tool of bureaucratic control, although new perspectives on the potential of accounting are emerging from consideration of alternative forms of organization (see, for example, Hopwood, 1979; Cooper *et al.*, 1981).

In the light of this close relationship between accounting and organization it is, perhaps, not

surprising to find that just as our conceptions of organization are currently undergoing substantial change, so too researchers have begun to question the adequacy of contemporary conceptualisations of the roles of accounting. In both fields, there is growing recognition of the limitations of the dominant paradigm which emphasises the underlying unity and cohesiveness of organizations and objectivist approaches to social science (Burrell & Morgan, 1979; Colville, 1981). From both is coming a common plea for greater interest in the explanation of radical change (Benson, 1977; Burrell & Morgan, 1979; Cooper, 1981) and, more especially, for more interpretive work acknowledging a move in the direction of subjectivist approaches to social science (Morgan & Smircich, 1980; Burchell *et al.*, 1980; Colville, 1981; Otley, 1984).

Although there are important differences between the several theoretical and philosophical statements of the subjectivist position (see Burrell & Morgan, 1979; Morgan, 1980; Morgan & Smircich, 1980), this growing interest in more interpretive work reflects the basic assumption that behaviour is to be understood, not as the patterned response to a clear, objective and external reality but rather in terms of actions emanating from the meanings people attach to their social world. From this perspective, the

processes by which such meanings are created and sustained are of central interest to those concerned with an understanding of social action. In the context of accounting, such an approach suggests that rather than assuming a role for accounting, for example as providing useful information for decision making, the ways in which accounting enters into the life of organizational actors remains to be discovered and understood. From this perspective, as Boland and Pondy propose, the research objective "is not to study accounting *per se*, but to study individuals acting in organizations as they make and interpret accounts" (Boland & Pondy, 1983, p. 225). It follows that such research must focus on accounting in its organizational setting (Hopwood, 1983).

Notwithstanding the increasing recognition of the importance of both process and context in the study of accounting, there are still relatively few empirical studies in this tradition which have taken accounting as their primary focus.<sup>1</sup> Thus, although it is widely acknowledged that accounting gains much of its contemporary significance from the ways in which it helps to shape and guide organizational processes and social actions, it appears to be the case that we still "have a very limited understanding of the forces that either influence accounting change or help to shape the different forms that the accounting craft can take" (Hopwood, 1983, p. 288; see also: Colville, 1981, and Otley, 1984). This paper is intended to address this concern. Its aim is to contribute to our understanding of how accounting is implicated in organizational life by exploring the findings of a study of resource allocation in the English National Health Service<sup>2</sup> (hereafter referred to as the NHS).

The study was undertaken in the late 1970s, at a time when the NHS was introducing a new formula as a mechanism to achieve a geographical

redistribution of financial resources. The research involved an observational study of the implementation of this formula in one of the Service's fourteen Regional Health Authorities. By observing the organization during a period of change, it was anticipated that the study would bring into focus the complex workings of the social system within which accounting is embedded and thus foreground many of the taken for granted assumptions about the workings both of these systems and of accounting (see Pettigrew, 1979; Boland & Pondy, 1983). The investigation thus provides the opportunity to explore what is involved in implementing accounting change within the enterprise and to discover how organizational actors come to an understanding of the meanings and implications of such change.

The paper is divided into six parts. The first two describe the organizational context for the study and the research methods adopted. The subsequent analysis begins by reviewing the problems facing the NHS in the allocation of resources and the factors leading to the development of an allocation formula. This is followed by a discussion of how the formula, and the philosophy on which it is based, was taken up within the Regional Health Authority. In examining how the new accounting both shaped and was in turn shaped by organizational reality, the discussion suggests that the relationship between accounting and organization processes is reflexive, with each defining and being defined by the other (Berger & Luckman, 1966; Bateson, 1972; Burchell *et al.*, 1980). The final part of the paper is devoted to a consideration of the relationship between the rhetoric and reality of this particular accounting. Taking rhetoric as being concerned with language and argument (Huff, 1983) and, in particular, with the use of language and other symbols for expressive purposes (Harré, 1980; Gowler & Legge, 1983), the paper

<sup>1</sup> Notable exceptions include Bower, 1970, and Malvey, 1981.

<sup>2</sup> Responsibility for this project lay with Anthony Hopwood and Janine Nahapiet. The project was one of several being undertaken at the Oxford Centre for Management Studies (now Templeton College) by a research group which also included Stuart Burchell, Colin Clubb and John Hughes. The author acknowledges the contribution of this group, Dan Gowler and other Centre colleagues to many of the ideas developed in this paper. She is also grateful to the Kings Fund College and the Regional Health Authority studied for their support for the research.

concludes with a consideration of accounting as a language for discourse, a set of rules for negotiating an understanding of organizational reality and a mechanism for establishing and maintaining the legitimacy of social action.

## THE ORGANIZATIONAL CONTEXT OF THE STUDY

### *The National Health Service*

The NHS was established in 1948 to provide a comprehensive system of health care. It was, and continues to be, funded by central government and is today represented at the highest level by the Secretary of State for Health and Social Services, who is a member of the Cabinet. The Secretary of State is responsible to Parliament for the provision of health services in England and is helped in this by junior ministers and civil servants at the Department of Health and Social Security. The NHS has undergone three major reorganizations in recent years, in 1974, 1982 and 1984. Since it was the 1974 structure which was in operation at the time the case study was undertaken, it is this structure, widely acknowledged to be complex (Levitt, 1976; OHE, 1977; Buxton & Klein, 1978; Haywood & Alaszewski, 1980), which will be described here.

Following the NHS Reorganization Act of 1973, the Service was organised along the following lines. First, the centralised functions of the Service were provided by the Department of Health and Social Security. Below Department level, the Service was organised into a three tiered structure comprising regions, areas and districts (see Fig. 1).

Each of these tiers represented a geographical entity charged with a particular set of duties and responsibilities as follows:

(a) *Regional Health Authorities (RHAs)*. Fourteen of these were established as statutory bodies accountable to the Secretary of State. Although the RHAs were responsible for some medical activities, for example through the appointment of certain senior medical staff and the provision of specified specialist services, their

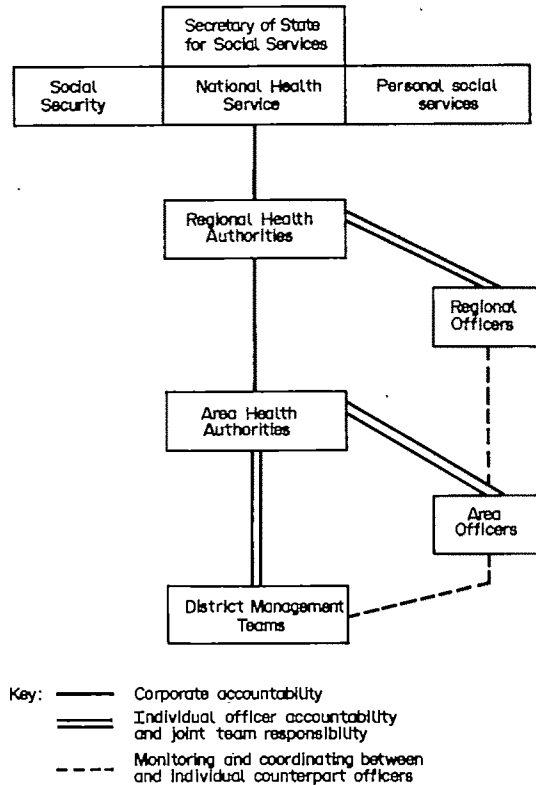


Fig. 1. The structure of the National Health Service, 1972.

main responsibilities related to planning and to the allocation of capital and revenue resources to the levels below them. The Authority Chairman and Members, all part-time, were appointed by the Secretary of State after consultations with interested organizations, including the main health professionals, the trade unions, the universities and the main local authorities. Members were unpaid but the Chairman could be paid on a part-time basis. Members met formally as an Authority on a monthly basis, although they often worked in sub-groups and working parties between each Authority meeting. While some had a detailed and intimate knowledge of Health Service affairs, others were less knowledgeable, frequently representing agencies with which the NHS interacts.

Each RHA was supported by a team of full-time officers and their staffs. This regional team of officers (RTO) comprised a regional Medical Officer, regional Nursing Officer, regional Administrator, regional Treasurer and regional

Architect. Although each officer had specific responsibilities, as a team they had collective responsibility for framing plans and proposing allocations, under a system of "consensus management" (DHSS, 1972; Levitt, 1976). RHAs, thus comprised statutory bodies charged with major administrative responsibilities but with few duties directly related to health service provision, these being the concerns of the levels below the Regions.

(b) *Area Health Authorities (AHAs)*. Each RHA comprised a number of AHAs and, when the 1974 structure was established, there were 190 of these. Like the RHAs, the AHAs were statutory bodies accountable directly to the Secretary of State. They carried full operational responsibilities for the Service, undertook much detailed planning as well as employing most of the NHS staff. In addition to holding responsibility for any teaching hospitals within their boundaries, they had important duties in respect of local government authorities. Although most areas were further sub-divided into districts, there were some, generally those with small populations, which were not so divided. Other than in these cases of single district areas, AHAs also had responsibility for resource allocation to districts. Area Members were appointed on a part-time basis either by the RHA or by local authorities and staff and professional groupings, with the Chairman appointed by the Secretary of State. Members met on a basis similar to RHA Members.

Each AHA was supported by an area team of officers (ATO) and their associated staffs. The ATO, comprising Medical Officer, Nursing Officer, Administrator and Treasurer, also operated under a system of consensus management. Although they had professional links to their regional counterparts, they did not report directly to them.

(c) *Health districts*. Health districts were established in order to manage the operation of the Service at local level. They comprised the smallest units for which substantially the full range of general health and social services could be pro-

vided and also the largest ones within which all types of staff could actively participate in management through the representational systems (OHE, 1977). Each health district was managed by a district management team which was jointly responsible to the AHA.

In summary, the structure comprised three different and separate levels of statutory authority: the Secretary of State, the RHA and the AHA. Each of these was "corporately accountable" to the level above, with the relationship between the various levels seen as a progression from strategic planning and resource allocation at the centre to contingent practical activity at the lowest levels (OHE, 1977). In other words, the main mechanisms to achieve coordination between the legally separate levels were the planning system, resource allocation and what were termed "monitoring" relationships, i.e. the right to receive information and review performance (DHSS, 1972; Levitt, 1976).

#### *The regional context*

The fieldwork on which this paper is based was undertaken in an RHA which will be called Omega. Omega RHA comprised four areas, referred to here as Alpha, Beta, Delta and Gamma. Three of these areas were further subdivided into two districts, the fourth, Alpha, being a single district area, incorporating the region's only teaching hospital and medical school. The structure of Omega RHA is presented in Fig. 2. Geographically, Omega covered four shire counties. Contrary to the prevailing national trends, it was also experiencing population growth, largely through the inward movement of people to new towns.

## RESEARCH METHODS

The data reported here were collected as part of a study of the role of information in the management and administration of the NHS. The project was stimulated by a widespread belief within the NHS that its information systems fell short of what was needed and that attention should be devoted to this topic, with particular

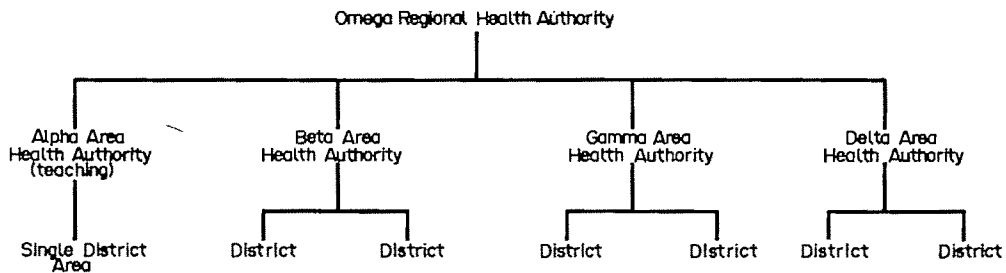


Fig. 2. The structure of Omega RHA.

emphasis on financial information (see, for example, DHSS 1972; Royal Commission on the National Health Service, 1978). Such was the primary reasoning given by the funding bodies for their interest in supporting research in this field.

The starting point for the researchers was the belief that a sound appreciation of the role and potential impact of financial and accounting information can only be developed by reference to the particular setting in which it is embedded (see Hopwood, 1983; Burchell *et al.*, 1980). Hence, the research was guided by the desire to develop an understanding of the way people communicate, talk about, act upon, use or ignore information in the context of their everyday life in organizations. Given this objective, the researchers did not set out to test a set of specific hypotheses but rather to observe and describe the actions of members of Omega and to attempt to identify the meanings underlying such actions (Glaser & Strauss, 1967; Harre & Secord, 1972). It was anticipated that an initial, if substantial, phase of observation and sense-making would lead on to a subsequent phase of action research. In the event, the study did not proceed to the second stage.<sup>3</sup>

Since a large part of the project funding came from the Omega RHA, it was agreed that fieldwork should be undertaken in the authority, across all three levels: region, area and district. By agreement with team members at each level, three main research methods were adopted by the author: semi-structured interviews, observation and analysis of documentation. This docu-

mentation ranged from reports and minutes of meetings to correspondence and press cuttings.

At the outset of the research, staff from all three tiers were interviewed individually at length across a wide range of topics. There were four main aims for these initial interviews: to establish relationships, to learn about the Region as a whole and the issues facing it, to discuss current and potential financial information and information systems and to clarify expectations about and secure practical support for the project. As a result of these meetings with over fifty people, a strong network was established, with the prime contacts at each level generally emerging as the Treasurer and/or the Administrator. Thereafter, interviews took place regularly throughout a period of approximately nine months. They included discussions with members of the original network as well as numerous other staff and authority members. In the main, they were arranged in order to pursue particular issues which had arisen through fieldwork observations or the reading of NHS documentation or other literature. Although most of the interviews took place on an individual basis, the researchers met occasionally with a steering group from the funding bodies. Sometimes these meetings were organised around formal reports from the researchers; at other times, they constituted a more general discussion of issues emerging in the research or the health service more broadly. They provided an additional valuable forum for feeding back observations and testing out interpretations as well as for exploring the degree to which the experiences of Omega might be

<sup>3</sup> The main reasons for this being developments within Omega, together with changes in the jobs of the researchers.

similar to those of other parts of the Service.

In the course of the preliminary interviews, it was agreed that the author should spend time in the various parts of the Region, observing a wide range of meetings identified by interviewees as likely, in the words of the Regional Administrator to officers, to "give a good feel for what it's like here". In practice, this involved attending "public" meetings, such as the monthly Authority meetings, as well as a wide range of "private" meetings, both routine and *ad hoc*, formal and informal, at each level and across levels. An office was provided within the Regional Headquarters building and many informal contacts were established there. After a short time of "being around" the Region, it was agreed mutually that it would be useful for the research if the author concentrated, at least initially, on two activities likely to throw light on informational activities within the Region. The first was the annual revenue allocation process and the second the implementation of what was known as the "Standard Accounting System", a computer-based package for financial information being installed throughout the NHS and in the early stages of implementation in Omega. It is the first of these which constitutes the main focus of this paper.

#### THE PROBLEM OF RESOURCE ALLOCATION IN THE NATIONAL HEALTH SERVICE

From its inception, the NHS raised major issues of financing. When the National Health Service Act was presented in 1946, it was recognised that there would be a heavy demand for resources as a result of the freely available provision of health care for all but it was confidently predicted that this demand would decline in due course, reflecting the healthier state of the nation's people. In fact, the resources sought for health care have always been greater than the supply (Buxton, 1976; Klein, 1983). Moreover, the desire to achieve a more equitable distribution of resources across the country, part of the

basic rationale for a National Health Service, has persistently remained some way from fulfilment. Two explanations are generally given for this state of affairs. The first is "policy inertia", i.e. the allocation of yearly increments largely on the basis of existing commitments, thus perpetuating inherited inequalities (West, 1973; Buxton & Klein, 1978). The second, which has been labelled "demographic drag", represents the failure to adapt the allocation of revenue and capital to demographic changes (Buxton & Klein, 1978). Together, these processes are such that unless there are deliberate attempts to decide otherwise, the pattern of resource allocation in the NHS follows the process of disjointed incrementalism observed elsewhere (Lindblom, 1959; Wildavsky, 1974).

In recognition of the problem, there have been three major attempts to alter the picture and to move towards an equitable geographical distribution of resources. A central element in each policy proposal has been the introduction of a formula as a basis for securing more objective resource allocations. The first formula was presented in the National Hospital Plan of 1962, aimed at equalising the distribution of hospital resources (Minister of Health, 1962). The plan established "norms" for the ratio of hospital beds to the population and then translated these norms into objectives to be achieved through the planning of hospital building over a ten year period. Within four years, the planned building programme had floundered, largely because insufficient funds were available to fulfil its requirements (Buxton, 1976). Nonetheless, the plan had reinforced the principle of equalisation and, at the same time, introduced bed usage as a proxy measure for morbidity (Buxton, 1976; Allen, 1979).

This formula approach to resource allocations has continued in more recent endeavours. 1970/71 saw the second attempt to redress the balance when the Department of Health introduced a formula based on a principle of equity, as opposed to equality, of provision.<sup>4</sup> This for-

<sup>4</sup> Equity is generally taken to mean "equal provision or equal access for equal need" (Buxton, 1976), whereas equality refers to similarity in the distribution of resources, regardless of relative need.



mula comprised three variables: the population of the region, hospital bed stock and hospital case flow. Again, the policy achieved limited success largely because the formula was regarded as unsatisfactory, being based on supply and demand rather than an independent measure of need (OHE, 1977). It thus perpetuated the favoured position of those authorities that were well-endowed with beds. The third campaign, and the most sophisticated in its calculations, was the approach proposed in the final report of the Resource Allocation Working Party, RAWP as it became known.

Guided by the philosophy of equalisation, the working party's major preoccupation was the development of an appropriate methodology to enable the implementation of what had long been accepted as a desirable aim: "equal opportunity of access to health care for people at equal risk" (DHSS, 1976, p.7). In seeking to develop a formula which would provide an acceptable measure of the need for health care, it argued that such a measure could not be based on crude population figures alone, since the needs of different sectors of the community vary. The formula eventually agreed on five different combined measures of need which were then applied selectively to the main elements of service provision in order to produce a "population equivalent".<sup>5</sup> This population equivalent became the basis for establishing "target" allocations to the regions. A similar calculation was then undertaken for determining the targets for the other major NHS tiers then in existence, i.e. areas and districts. Finally, by comparing the existing level of resource allocation for any region (or area or district) with its target allocation, it was possible to obtain an assessment of current levels of under or over resourcing.

The publication of the RAWP Report stimulated a vigorous debate over its contents. Some were highly critical of the methods adopted (see

Barr & Logan, 1977; Radical Statistics Health Group, 1977; Buxton & Klein, 1978), while others expressed more concern over the consequences of implementing the proposals contained in the Report (See Maynard & Ludbrook, 1980, for a good review). However, the early endorsement by the Secretary of State for Health and Social Security of its recommended move towards equalisation represented for many the culmination of over twenty years of analysis and discussion of resource allocation policy and practice. In a period in which the demand for resources was increasingly outstripping their availability, there had been a growing commitment to the view that, within the limits of available resources, health services should be provided more fairly in relation to needs. The main obstacle to achieving this was regarded as the difficulty of assessing need. At last, with the development of the RAWP formula, there was now a measure of relative need and an associated accounting procedure available to guide decision making.

The RAWP Report and its supporters, both nationally and within Omega, argued that the formula appeared to achieve three important requirements. First, it provided a way of quantifying an objective which it had been difficult to pursue in the absence of an adequate measure. Second, it was argued that, as a result, it enabled a change in the processes and methods of allocation. Specifically, it was suggested that the existence of a formula made possible consistent and deliberate planning and thus facilitated a move away from the prevailing pattern of incrementalism (DHSS, 1976). Third, it provided what was described as an objective, equitable and efficient way of resolving the difficulties involved in implementing different priorities in times of limited resource availability (DHSS, 1976). As expressed in the words of one of the Omega Region's own allocation policy documents:

<sup>5</sup> Need was assessed in relation to: the population size, the age/sex distribution of the population, population mortality rates (used as a proxy of morbidity), cross boundary flows of in-patients, and medical and dental education. The service elements to which these factors were applied were: non-psychiatric in-patient services, all day and out-patient services, mental illness in-patient services, mental handicap in-patient services, community services, ambulance services and family practitioner administrative services.

"How can we rob Peter to pay Paul *without* an agreed formula?" (emphasis added).

Following publication of the RAWP Report, the Secretary of State for Health and Social Services indicated that its recommendations would be used as the basis for future allocations to the regional health authorities and that he expected regions to do likewise in making their allocations to the areas. The rest of this paper is concerned with how RAWP entered into the annual revenue allocation process in the Omega Regional Health Authority. The aim throughout is to consider what RAWP came to mean to those most directly concerned with its implementation.

#### HOW ACCOUNTING SHAPED ORGANIZATIONAL REALITY

NHS resources are allocated on an annual basis under the two main categories of capital and revenue. Once the allocation for the DHSS has been established by Government, this is then subdivided into the departmental budget and the regional allocations, the latter then becoming the responsibility of RHAs for further distribution to areas and districts. At the same time as the authorities announce their one year allocations, they are also expected to confirm resource assumptions for a further three year period in order to assist the planning process. Each stage of this allocation process is expected to take account of current policies and priorities, these being communicated in guidelines issued by the Department to the health authorities. Thus, it is the formal responsibility of the authorities to make the allocations taking into account the advice of their officers and staff.

Omega RHA planned to confirm its final allocations to areas in February, before the start of the financial year in April. In the preceeding months, there were numerous formal and informal discussions about the forthcoming allocation process. Although almost all of those interviewed described resource allocation as an essentially routine activity, nonetheless there seemed to be a high level of interest in what the

Authority would do. Discussions with people in Omega suggested three reasons for this. First, those in the areas and districts were eager to know what their allocations would be in order to do their own planning and budgeting. As one Area Treasurer observed "the discussions they have at Region come down to hard reality at Area". Second, the previous year's allocation and resource assumptions agreed by the RHA had attracted adverse publicity. Beta Area in particular had challenged the Region's decisions, believing it should have received higher levels of resourcing in recognition of its fast growing population and current low level of funding, assessed in RAWP terms. It had drawn public attention to its dissatisfaction, involved prominent local dignitaries including its Member of Parliament, and there had been criticism of the RHA in the local press and radio. As a result, many of the Regional Officers and Authority Members were acutely aware of the sensitivities involved in resource allocation and were eager this time to avoid what one prominent Member of the RHA described as "political screaming". Third, many people at Regional level, particularly the treasurers, reported a feeling of greater than usual uncertainty about both the likely amount of money the Authority would receive and also the basis for the allocation. The cause of this uncertainty was attributed to RAWP and its implementation by the DHSS.

In the months prior to the allocation decision described here, the Regional Officers and Members came to know about RAWP and its recommendations in a number of ways. These ranged from the widespread publicity given to the Report in the national media and the main publications of the Health Service to direct communications from the Ministry of Health giving details of the proposals and indicating the Minister's likely support for the RAWP recommendations. Numerous lectures and seminars were organised by Health Service groups and several of these were attended by staff of the Omega Region and its constituent areas and districts.

The Report was very quickly viewed by the Regional Officers and Members as something to be taken seriously for at least two reasons. First, it was associated with the goal of equalisation.

Interviews and analysis of earlier reports and RHA minutes indicated that staff and Members supported the general principle of equalisation, which they frequently referred to as "fair shares". Indeed, Omega had itself attempted an exercise not many years before in an endeavour to develop what one of the administrators described as "a more systematic way of distributing resources". Moreover, the experiences of the previous year, in which Beta Area had publicly challenged the RHA, had reinforced the desire to find a way of achieving a "fair" distribution of resources as soon as possible. Second, RAWP was regarded as potentially significant because the early indications, in ministerial statements, press comment and informal discussions with departmental staff, were that it would be used by the Minister as a basis for making allocations to the regions. Since Omega was one of five regions assessed as being over-resourced in relation to their RAWP targets, this could have major consequences, for not only might it imply that there would be little "growth" money available but there might even be a cut in the existing level of resources. RAWP was thus seen as a "real force" that could adversely and imminently affect the financial position of the Region.

This recognition of the potential significance of RAWP was accompanied by confusion and concern. The vast majority were confused because almost everyone found the formula extremely complex and the derivation of targets almost impossible to follow. This included most of the treasurers and their staff, the officers most heavily involved in preparing papers and proposals on resource allocation for their authorities. A great deal of work had thus to be done if they were all, as one administrator put it "to try to come to terms with what RAWP is about". To achieve this, numerous internal meetings were held to discuss, explore and familiarise both Officers and Members with the details of the RAWP formula and the calculation of targets, together with their implications for Omega. Accompanying the general confusion was the concern of the small group of statisticians and community physicians in Omega. Although drawn from across the Region, the majority were

based either at Regional Headquarters or in the Alpha Area. It was these people who had the technical expertise to understand the details of RAWP and, on seeing the RAWP Report, they immediately expressed strong reservations about the appropriateness of several elements and their weighting in the formula. These mirrored those being expressed nationally. A working group of treasurers, statisticians and community physicians drawn from all levels in the Region was soon established to examine the policy and the formula more closely.

Thus, shortly after its appearance, RAWP had acquired a significance for those involved with resource allocation in the Omega Region, although the nature and level of that significance had yet to be worked out. Far from having clear and unambiguous consequences for the allocation of resources, the meaning and potential implications of the approach would need to be identified. However, even though there was much still to discover about the meaning of RAWP, it could already play an important role in shaping the processes of understanding and hence, of the action which ensued. First, it re-defined the resource position of the Region and thus affected Officers' and Members' perception of Omega's problems. Second, it shaped their views of what was important by re-defining the agenda for resource allocation choices and by focussing attention on particular items in that agenda while, at the same time, backgrounding other items. Third, it created the circumstances for the discovery and rediscovery of organizational reality.

#### *RAWP re-defined the Region's resource position*

The story goes that three umpires disagreed about the task of calling balls and strikes. The first one said 'I call them as they is.' The second one said, 'I call them as I sees them.' The third and cleverest umpire said 'They ain't nothin' till I calls them' (Simons, quoted in Weick, 1979).

The task to be accomplished by the Omega Regional Health Authority in the period under review was to decide on the revenue allocations to its four constituent areas for the year 1978/79 and to establish their resource assumptions for

three years ahead to meet the needs of the planning process. This was seen to require an analysis of the current financial position of the organization in order to ascertain the starting point for considering the factors which would determine future allocations and resource assumptions.

The entry of RAWP onto the scene was regarded as complicating the already difficult process of discovering what one of the treasurers described as the "true financial position" of the region. Several practices make it difficult to establish or "call" an accurate picture of the end of year resource position of the region and areas. These include the ways in which authorities manage their "reserve" funds and their attempts to modify reported over and under spendings to ensure that they fall within the margins allowed by cash limits policy (See Nahapiet, 1984). The effect of RAWP was to add another frame of reference for interpreting the Region's current resource situation. Not only was it concerned with spending levels and commitments but also with the assessment of its overall position in relation to target. A new "call" was now available to interpret the state of play.

This new definition, derived from the RAWP formula, labelled the Omega Region above target and hence, over-resourced. This had been, for most of those interviewed, an unexpected interpretation of its position because in the Interim Report of the Resource Allocation Working Party, which had proposed a different formula, the Omega Region had been assessed as below target. A change in the formula had thus altered their appreciation of Omega's resource position. Accompanying this appreciation was the recognition that, if the RAWP analysis was widely accepted and, as a consequence, they were taken to be over-resourced, then this could significantly influence their future financial situation. Participants thus found themselves in a situation in which, at the same time as they were trying to comprehend the detail of the formula and to evaluate its credibility, they were coming to a new understanding of their organizational situation and its potential problems, an understanding resulting from the manner in which the same formula had defined and then re-defined

their resource position.

#### *RAWP created particular patterns of organizational visibility*

Over and above its significance in providing an overall assessment of the Region's relative resource position, the RAWP approach played an important role in structuring the concerns and issues raised in discussions and analyses concerning resource allocations. Specifically, through categorising resources in particular ways and attaching certain labels to them, RAWP brought some elements clearly into focus while leaving others less prominent.

Four items in particular were foregrounded in all the Region's discussions and documents relating to the allocations to be made to Areas. Three of these were directly related to concepts and issues presented in the RAWP Report, the fourth concerned the manner of its implementation in the period under review.

*Targets.* Despite the many, continuing reservations expressed about the details, a major and significant product of the RAWP formula was the calculation of a single figure to represent what an Authority's allocation should be on the basis of its relative need. This figure was presented as "an objective yardstick" (DHSS, 1976) providing everyone with a direct and quantitative basis for assessing and comparing their relative resource positions. In the context of Omega, although all the Region's four areas were above their national target, when assessed on a Regional basis, there was a considerable disparity between them. One of the areas, Alpha, was considerably above target whereas a second, Beta, fell below target by an equivalent amount. The remaining two Areas appeared to be more or less close to their target positions. This difference between Alpha and Beta in relation to their distance from target became the focal point for most of the resource allocation debate and discussions. The concept and calculation of targets thus determined a particular interpretation and evaluation of the intra Regional situation.

*Equalisation.* Although the principle of re-

source equity had long been endorsed, in the NHS generally and specifically within Omega, it had been difficult to pursue in the absence of an agreed measure. With the emergence of a method for calculating target allocations, the goal of equalisation became both more visible and more tangible. The term equalisation was used frequently in documents and discussions and, within Omega, it was generally agreed that allocation decisions should ensure movement in the direction of target — a position formally approved by the RHA early in its discussions of revenue allocation policies for the year in question.

*Funding by formula.* As discussed earlier, the high priority attached to the goal of equalisation was seen as requiring a change in the prevailing method of resource allocation, a process which Omega itself characterised as disjointed incrementalism in one of its reports. In its place would come a system described by Omega as “funding by formula”. The nature of this formula approach was a theme which surfaced repeatedly throughout the allocation process.

*Growth money.* In the months leading up to the allocation decision, the statements by the Minister and the messages coming from the DHSS were first interpreted by Omega as implying that the Region might experience a cut in its existing level of resourcing. Subsequently, it seemed more likely that it would remain at its current level. When, in March, Omega was informed that it would be given extra resources, i.e. “growth money”, almost all discussion switched from existing funding levels to the use of this money. The figure available amounted to only 0.7% of the Region’s total allocation, but it established the limits and became the almost exclusive focus for exploring the feasibility of equalisation. Moreover, being labelled “growth” money, those authorities receiving it could be regarded as being given an opportunity for services development and extension. By implication, those not promised growth in the allocations or resource assumptions were seen as held back, even if in other terms, for example, posi-

tion in relation to target, they were already well placed.

Just as the language and logic of the accounts drew attention to these four aspects of the situation, by the same token, many other items of equal or greater significance in absolute financial terms, were so backgrounded that they were hardly discussed in allocation meetings, formal or informal. Three were particularly striking and all of them having labels with associations of invisibility or transience. They were:

*“Off the top” items.* One of Omega’s allocation documents stated that “the allocation to the region includes some items for which distribution by formula would be inappropriate ... these items need to be deducted from the total allocation so as to arrive at that part that can be apportioned by formula.” These items include allocations “earmarked” for particular purposes, such as new towns, “first charges” for items such as the costs of Regional Headquarters, the service increment for teaching, London weighting, and, in the case of Omega, items for which it had not yet been possible to endorse the RAWP formula calculations, such as the costings for mental illness and mental handicap. These deducted items were described as “off the top” elements. Although together they amounted to just under 20% of the total allocation, they were barely discussed in any of the resource allocation meetings and no modifications were made to proposals for these items.

*Authority “reserves”.* It is not unusual for health authorities to “hold back” some of the available resources in the form of a regional or area reserve, to provide funds for special needs and unexpected contingencies. Omega RHA was no exception. Its allocation proposals contained recommendations for holding a sizeable Regional reserve, but no explanation or clarification was requested of the need for this and no challenge was made to its use or appropriateness.

*“Non-recurring sums”.* Much of the discussion at meetings was stimulated by and focussed on pictorial representations, pie charts and

graphs, of the proportions of money allocated to various areas and to their positions in relation to target. All of these were based exclusively on proposals for recurring allocations. At the same time, there were sizeable amounts of money to be distributed on a "one off basis", often available through underspending of previous "reserves". These non-recurring items were, in practice, more than the available growth money although they generally received very little attention. As one of the Members commented in a private meeting: "The graphs do not represent the full picture. For example, Alpha might react on the basis of the situation as depicted graphically, when in fact the figures show that they are getting more money through the funds allocated on a non-recurring basis".

Together, these less visible items added up to an amount of money many times the size of the "growth" money, yet they were barely acknowledged in the discussions and debates about allocations. The categories and labels adopted to describe them appeared to take them completely out of the picture, leaving attention focussed almost exclusively on targets and growth money.

#### *RAWP created the circumstances for organizational discovery and renewal*

The explicit purpose of RAWP was to stimulate organizational change. By providing a language and a logic for assessing current and future resource distribution, the approach created the circumstances conducive to a reconsideration of NHS policy and practice.

A frequent topic in Officer meetings and informal discussions was speculation about whether or not a real change in allocation policy and practice would happen. In the early stages of the resource allocation round, the RTO became committed to the view that change should and would come about, a view that was subsequently publicly endorsed by the RHA. It was argued that it should because allocation on the basis of equalisation was "fair". It was anticipated that it would because the Department was expected to base its allocations to regions on RAWP, a practice which would then be followed across the

other tiers. As one Officer, strongly committed to equalisation, put it "the day of Corkscrew Charlie is over; the emphasis now is much less on working the system, which is now accepted as inappropriate, and more on the logical distribution of resources". At the same time, however, some doubts remained. History and experience had shown that, notwithstanding numerous attempts to introduce redistribution policies, there had never been major changes in the allocations to health authorities. The position thus seemed uncertain. If new procedures based on RAWP were really to be applied, Omega would face severe financial difficulties; if experience was anything to go by, then the proposals would probably be modified and the Region's position would be relatively unaltered. Herein lay a dilemma discussed by Officers with increasing frequency — would RAWP really herald a change in NHS allocation policy and practice?

While RAWP undoubtedly stimulated debates about NHS decision making in general and the position of the Omega Region in particular, the resolution of these debates lay outside RAWP itself. Although RAWP played an important role in shaping organizational reality, fieldwork observations suggest that the interpretation and significance of RAWP were, in their turn, significantly shaped by the particular circumstances of the time.

#### HOW ORGANIZATIONAL REALITY SHAPED ACCOUNTING

The close relationship between organizational characteristics and the RAWP formula was recognised from the outset. In their final Report, the Working Party themselves point out that the elements of the formula were restricted by the need to include variables for which information was readily available at regional, area and district levels. Although other factors were recognised as being both important and relevant to the measurement of health care needs they stated that "we had perforce to consider only those criteria, the supporting statistical data for which are read-

ily available and reliable at all three levels of disaggregation required" (DHSS, 1976, p.8). Thus, what went into the formula was a function of the information already collected and its analysability in ways consistent with the major groupings in the NHS.

If organizational factors determined the content of the formula, they also provided the context within which its implications were to be worked out. This too was acknowledged by the Working Party who identify the need to allow for local circumstances in the application of their recommendations. They suggest, for example, that "the proposals . . . should enable health Authorities to determine allocations in accordance with common criteria and a common methodology while allowing necessary flexibility to meet local variation" (DHSS, 1976, p.44).

Observation of the implementation of RAWP in the Omega RHA suggests that these local circumstances shaped the accounting in important ways. First, since RAWP was but one of several possible indicators of resource need, its validity and importance were evaluated in the context of these other representations of need. Second, the implementation of RAWP as an objective and systematic method, based on common criteria, involved reassessing the place of such an approach in the ongoing process of selecting appropriate ways of managing the enterprise. As a consequence, the meaning and interpretation of targets, together with the manner in which they were applied in support of the equalisation policy, were inextricably bound up with organizational reality as perceived and interpreted by participants.

#### *RAWP is but one among several measures of need*

Although RAWP emerged as a way of resolving the difficulty of assessing the relative need for resources of different parts of the NHS, in practice it was but one of several indicators of need. Specifically, within Omega, the picture presented by RAWP had to be set against the different interpretations suggested by the planning system and demands to open new capital schemes.

*RAWP and the planning system.* The NHS planning system was launched in 1976, the same year that the RAWP Report was published. This system set out a structure for the development of strategic and operational plans and provided guidelines on planning methods priorities. It soon became apparent that RAWP and Planning constituted contrasting bases for identifying health care needs. RAWP was primarily concerned with the allocation of resources whereas planning addressed itself to their deployment (See Bevan *et al.*, 1980). Working from the DHSS, RAWP represented a top down approach to health care in contrast to the bottom up analysis of the planning process. In terms of their information, they drew on some common but also some different data bases as a result of which the two systems sometimes came to different conclusions. For example, in the context of Omega RHA, although the RAWP formula suggested that Alpha Area was above its target and hence over-resourced, according to the planning system Alpha was in need of extra resources to bring it into line with service norms. Thus, when it came to deciding whether Alpha should be given additional revenue the RHA had to choose between conflicting interpretations of the Area's financial position. Although Alpha presented vociferously a strong case for its needs on planning criteria, informal discussions and interviews at Regional level suggested that most, though not all, people felt that RAWP painted the truer picture. As one Officer commented "by whatever criterion you take, Alpha can be shown to be fat". On this basis, Omega continued to support the principle of equalisation, accepting that it implied the allocation of additional resources to Beta and not to Alpha.

*RAWP and capital schemes.* In contrast to the broad assessments of need to emerge from administrative systems such as RAWP and planning, there were other more specific claims for resources. In the period of this study, the most pressing of these was a call for the revenue to open newly completed capital schemes. Many of these hospitals had been planned at a time when the Government was attempting to encourage

new capital developments by providing the revenue required to operate those developments which it had approved. The provision of the revenue consequences of capital schemes, RCCS as it became known, was withdrawn during the 1970s, although some of the buildings, including major hospitals, which had been planned under the scheme had not yet been completed. Within the Omega Region there were several schemes nearing completion and the Region had committed itself to trying to find the resources to open them.

Herein lay the basis of the dilemma that was to face the Authority in making its allocations to areas. In the months leading up to the revenue allocation for 1978/79, the Omega RHA had committed itself at different times to meeting two worthy and important needs: the need to equalise and to open new hospitals. However, only when the Authority sent the Regional Officers away to develop detailed proposals on how it could achieve these, did it become clear that in the context of Omega, the two policies were in direct conflict. In order to equalise, it would be necessary to find additional resources for Beta, the area clearly below target. But the main need for RCCS was for the new teaching hospital in Alpha, the area already well above its target (see Fig. 3).

In reconsidering their support for equalisation, the Officers and Members now had to assess the relative importance of two different and

legitimate claims for additional resources. Both in interviews and in several of the regional documents the decision was described in terms of choosing between "funding by formula" or "funding needs". Support for equalisation implied endorsement of a particular approach and a method of allocation. The RAWP Report itself acknowledged that its work and the formula it produced dealt with the distribution of resources rather than their deployment and "in this sense it is concerned with the means rather than the end" (DHSS, 1976, p.8). But the claim competing with equalisation in Omega derived precisely from a particular deployment of revenue and represented the visible and pressing problems of a new but unopened teaching hospital. The implementation of RAWP thus involved balancing the general principle of equalisation against the specific demands of an identifiable institution. As expressed in the words of one of the Authority Members, the choice came down to a basic dilemma: "Which is our greater duty: to equalise or to support the medical school?"

*Accounting change reflects rather than determines the resolution of administrative dilemmas*

Within the literature on organizations, there is a stream of analysis which interprets the task of managers and administrators as being able to find an appropriate balance between a number of persistent and conflicting pressures (see, for

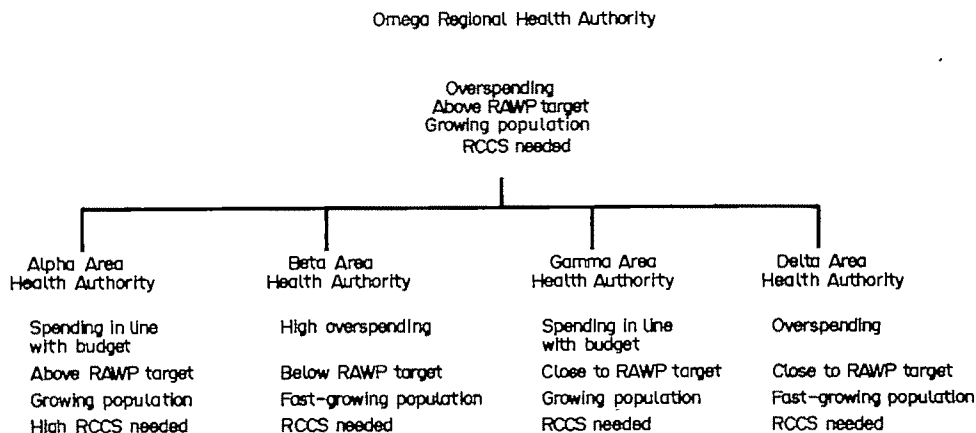


Fig. 3. Financial position of the Omega RHA and its Constituent AHAs.



example, Drucker, 1977; Self, 1977; McLaren, 1982). Writers argue that the balance struck between say, centralisation or decentralisation, formality or informality, is not a once and for all achievement but one which is to be accomplished continually through assessing and reassessing the particular organizational and environmental situation as it develops over time. In this section, it is argued, that the emergence of RAWP acted as a stimulus which resurfaced explicit consideration of three fundamental organizational dilemmas. However, rather than determining choice, the eventual impact of RAWP within Omega was itself determined by participants' interpretation of how these dilemmas should be resolved in the light of the way they saw their organizational circumstances. The main dilemma encountered was the relative importance to be attached to objective analysis versus subjective judgements in the making of allocations. Exploration of this issue also raised questions about how far such decisions can be viewed as requiring a judgemental or compromise decision strategy and the related issue of the degree to which to which the grounds for choice should be made explicit or kept ambiguous.

*Objective analysis vs subjective judgement.*

Most of the advisory reports proposing the need for a formula approach to resource allocation in the NHS recognise several limitations in the use of such formulae. Three appear to receive particular attention in the documents and discussion of RAWP.

First the elements of a formula are a function of the information available and there may be reservations about the validity of reliability of this information. The most obvious concern in the context of RAWP was the validity of using of mortality data as a proxy for morbidity (see Buxton & Klein, 1978). The RAWP Report states that it was the data on mortality that had the greatest effect on the changes they recommend and that there might be doubts about the suitability of this data. Nonetheless, the Report endorses its general validity.

Second, formulae can only include variables

that can be quantified yet there may be other factors which are important but which are not amenable to inclusion in a formula.

Finally, the logic for the formula is that it represents a standard approach which should be applied consistently. But standardisation and consistency undervalue local variations and these may be significant when assessing local need.

Because of these limitations, what was variously described in Omega as the "rational", "mechanistic" approach had to be adjusted in the light of judgements.

Most of the RAWP documents represent a dialectic between the need for objectivity and the need for subjective judgements in the making of allocations. For example, the Working Party Report says: "too rigid an interpretation ought not, in our view, to be placed upon revenue targets assessed on the lines recommended" but it goes on to add "they nevertheless provide an objective yardstick ... against which the need for resources and therefore the crucial allocation process can be determined". However, they conclude that "in the final analysis judgement must play a considerable part" (DHSS, 1976, p. 41). Similarly, a letter from the DHSS to the Omega Region, giving details of their allocation and the guidelines for distributing it, presents the same dialectical approach: "Authorities should not seek to apply mechanistically a predetermined rate of change from existing allocations towards 'targets'. The Secretary of State's decision on the pace of change as between regions took account of a range of unquantified factors and of special local pressures affecting the service ... nevertheless, the Secretary of State expects to see a significant redistribution of revenue resources achieved generally in 1978/79 and he wishes authorities to make clear the reasons why it is not practicable in particular instances." RAWP as an accounting procedure now appears to represent an objective but restricted approach requiring judgement in its application, judgement based on an appreciation of local circumstances and unquantified variables. However, each of these documents remains unspecific as to the precise

weight to be given to the "unquantifiables" or to "local factors". They do, however, recommend two processes which are to be followed in the making of such judgements. First, they argue that the approach can work only if the criteria and methods of allocation are made absolutely clear to those receiving allocations at all levels in the NHS. Second, they recommend that there should be continuing, open discussion between all concerned as part of an ongoing process of clarification and improvement.

*Explicitness vs ambiguity in the explanation of decisions.* The guidelines from the DHSS to Omega accepted that it may be necessary to make judgements about how RAWP is applied but stated that the reasons for deviations in the manner of its application needed to be explained. Faced with the dilemma of choosing between providing resources for equalisation or for new buildings, the Officers in Omega encountered this recommendation as a problem. First, it was difficult to discover what the DHSS had itself done in making allocations to regions. Frustrated by the ambiguity of the guidelines, several attempts were made, in the words of one Officer, "to nail the Department to see just what their guidelines do mean". These involved telephone conversations, correspondence and meetings with DHSS officers. Nonetheless, it was still not possible to find out precisely how their calculations had been arrived at and therefore to consider whether it would be appropriate for the region to do likewise. Second, it was recognised that being too explicit made it difficult for the Authority to alter its plans at a later date even if such change seemed appropriate in the light of different circumstances. This difficulty was highlighted by one of the Members when the Authority was beginning to reassess the options for future resource assumptions and the priority to be attached to equalisation. Although in the months prior to the allocation round, public opinion and the statements of the Minister had seemed to endorse the importance of equalisation, the failure to open newly completed hospitals was now creating adverse publicity nationally about management in the NHS. The tide of

opinion as measured by the content of ministerial statements, press reports and informal discussions, was now moving in the direction of regarding the opening of hospitals as a high priority. Discussing the need to reassess the initial resource proposals favouring equalisation, proposals which had been circulated but not yet endorsed by the Authority, a Member pointed out "we need to be able to justify the movement away from a nearly declared policy. The situation has changed but Members need to be able to justify new policies". In a context which they regarded as characterised by change and uncertainty, there appeared to be sound reasons for following the behaviour rather than the advice of the DHSS by attempting to preserve rather than reduce ambiguity (see Nahapiet, 1984). Thus the view expressed by another Authority Member that "one of the problems now is that we are giving out too much information" and "this should be avoided in the future", met with widespread approval. This seemed to be especially important given the competing and conflicting interests of the Region's four areas.

*Judgement vs compromise as a basis for choice.* The formal documents providing advice on the application of RAWP, with their emphasis on choice through a combination of computation and judgement, presume a model of organization in which the goals and objectives of the various groupings are known and shared (see Thompson & Tuden, 1959). The situation pertaining in Omega differed from this model in two important respects. First, the four areas in Omega were, in practice, in direct competition with each other for the limited resources available. Each was trying to make the strongest case possible for its share of the cake. Second, for a period during the allocation process, the Regional Authority was unsure what its own objective was or should be. It had yet to decide between equalisation and capital schemes. The espoused logic of RAWP, with its emphasis on open discussion and shared analysis appeared to ignore the political reality of the situation and the searching and compromise which it in-

volved. Thus many of the discussions in the Region also constituted a dialectic between the need for an analytical approach and the need for political sensitivity in its application. For example, the Regional Officer who stated in an Officer meeting that he was "wedded to a logical approach which involves spelling out one's objectives, having all the facts available, debating the options and making explicit the reasons for choice" was later heard to argue for the careful and selective presentation of a new option on the grounds that "basically, what is needed now is for us to play politics". From an early endorsement of the rational analytic approach, there was increasing recognition of the need for a political compromise. By now, it was accepted by the Officers and Members that the Region's early emphasis on equalisation had to be tempered by the growing concern over unopened hospitals. The application of RAWP would need to recognise this political reality, difficult though it was. In the words of one of the DHSS officers invited to attend a Regional Health Authority meeting:

I don't envy the Officers their task, for they have to look up to the DHSS and down to the Areas in an attempt to please all. What is wanted is for you to produce a package which is free from criticism, does justice and sends the children to school with shoes on.

*Accounts are reinterpreted to meet organizational needs*

There followed a period of frequent meetings and intense discussions to find a solution to the dilemmas. Observation of these meetings and interviews with participants suggest that three factors were important in the way Omega resolved the need to do justice, avoid criticism and provide for at least the basic requirements of areas. These involved applying the same approach as the DHSS had done in making its allocations to Regions, using the pace of change as a variable to allow flexibility in the achievement of equalisation and third, reinterpreting the meaning and calculation of targets.

*"Do as done unto"*. The RAWP Report placed considerable emphasis on the need to establish targets on a compatible basis throughout the

country, arguing that "there would be little point in using one basis for remedying disparities between RHAs if RHAs were free to distribute finance to, their AHAs . . . using different and incompatible criteria" (DHSS, 1976, p.38). Although the point was made to stress the importance of using the RAWP formula to calculate area targets, the argument for a consistent approach was one which the Omega Region attempted to pursue in every detail. However, their reason for doing so appeared to derive as much from the justification it provided for managerial action as from support for the principle of consistency. As one of the Officers explained when discussing the intricacies of the RAWP formula: "this is generally very complex. I know I shouldn't bring politics into it, but someone has to explain to the whole Region and also to those Areas that are potentially losing by modification to the RAWP formula; it might be better to stick with the national formula on a do as done unto basis, even recognising its limitations; if we change, the issue is: how do we justify it?" And on another occasion, in explaining the basis for revised proposals, a treasurer explained that the regional team of officers (RTO) "had tried to find out what the Department had done; the RTO therefore applied a similar analysis within the Region; we were trying to apply a similar reasoning to that of the Department".

In discussions about this adherence to the behaviour of the DHSS, staff in the Region offered two explanations. First, they pointed out that it is often hard to generate better technical work than that of the Department. Second, and more important, they drew attention to what they described as the "vulnerability" of Officers and Members. As one senior administrator commented "the NHS is a non-risk taking, non-innovative environment. People are not prepared to comment or make choices until they are sure that they are absolutely correct. This applies particularly to the management side, who are more vulnerable in this respect." This view was endorsed by another senior member of staff who observed that "we listen too much to the Department and are too mechanistic in considering their guidelines . . . the reason is the organiza-

tional culture; people are vulnerable to public criticism and therefore need to protect themselves. This is an absolute shame and a tragedy but people do it for reasons of safety." The insecurity and uncertainty experienced by the Officers and Members thus produced an apparently rigid conformity to the Department's approach to RAWP. This conformity resembles that observed in other sectors, such as education, in which the efficiency and effectiveness of decision making are notoriously difficult to establish (see Meyer & Rowan, 1978). It has been argued that, where such organizations are dependent on their environment, they remain successful to the extent that they incorporate the practices and procedures defined by prevailing rationalised concepts of organizational work and institutionalised in society (see Meyer & Rowan, 1977, and Scott, 1983). Not infrequently, this leads to actions which imitate those of key external agencies, as in the Omega Region. Moreover, this attempt to follow the reasoning of the DHSS was also supportive of the second mechanism used by the Region to resolve its allocation dilemma.

*Pursue equalisation but slow down the pace of change.* It had always been recognised in discussions of RAWP that by lengthening the time it took to achieve equalisation it would be possible for authorities to cope with particular local difficulties. The case for this argument was, in the view of the Omega Region, strengthened by the behaviour of the DHSS which, by continuing to give additional resources to above target regions, had itself been prepared to accept some movement away from target in the short term although remaining committed to equalisation in the longer term. This argument was supplemented in Omega by a third and potentially more significant element.

*Reinterpretation of targets.* It has already been observed that the Omega Region began this allocation round committed to pursuing the general philosophy of equalisation although expressing some reservations about the details of RAWP. As time went on, it slowly began to re-

assess the central element of the equalisation approach proposed by RAWP, i.e. targets. Specifically, the fieldwork evidence shows that the interpretation of both the meaning and methods of calculating targets changed over time to accommodate the competing pressure to provide money to open Alpha's new hospital.

Early reinterpretations essentially involved restatements of the limitations acknowledged in the RAWP Report and already reviewed earlier in this paper. Thus, talking to the Omega regional team of officers, one of the DHSS staff pointed out that "The (Region) and, perhaps, some of its areas, have been too preoccupied and concerned with targets. Targets are not to be regarded as absolutes . . . . The RAWP formula and the document itself point out that there are a large number of unquantified variables which might influence the interpretation of targets". This was followed by statements within the Region of the sort: "the unquantifiables are being given greater weight than equalisation". Similarly, reservations were again expressed about the validity of the calculations, as was suggested by one of the treasurers: "The figures are not accurate enough to justify tremendous effort to get Alpha and Beta exactly on target". Perhaps the final undermining of targets came in an informal meeting of Authority Members when it was stated that "the point about a target, at region or area, is that it is arbitrary. That is, it is calculated taking certain things into account; having calculated it it is then necessary to make judgements".

Notwithstanding these reservations and provisos, Omega had publicly committed itself to, and wished to maintain, a level of support for equalisation. At the same time, it now recognised and accepted the need to provide extra resources for Alpha to open the new teaching hospital. The question facing the RHA was "how?".

The possibility of achieving both came through a reinterpretation of the nature of targets and the development of a modified way of calculating them. This breakthrough involved a new concept, the concept of "banding". The term first appeared in a discussion between statisticians and community physicians in which it was suggested that instead of viewing targets

as a single figure, they could be regarded as falling somewhere within "a band of error" of plus or minus 2%. This process of banding would explicitly acknowledge that the calculation of targets inevitably involved a degree of statistical error. Moreover, if targets were assessed in this way, then it would be possible both to equalise and give Alpha some growth money for its hospital. The idea seemed a good one to Regional staff and led to the development of a rationale and method for calculating the banding limits. This was explained in the following terms: "we looked for a factor that would relate Alpha to Beta and took a factor of six times; in other words, whatever growth money Alpha gets, Beta should get six times as much . . . it is difficult to provide an alternative argument; the justification for the factor is that it achieves its objectives; it gives some growth to every Area and pulls up the worst off Area; the factor may change as areas approximate target."

Having provided a new interpretation of targets, together with a systematic method for calculating them, it was proposed and agreed that the objective of equalisation should be pursued within the banding limits. In financial terms, this meant allocating all the growth money to Beta for one year, and then linking future growth funds to the Region's main capital schemes, of which Alpha's was the largest. Thereafter, the resource assumptions proposed allocations calculated in order to equalise across areas while at the same time ensuring that each area could look forward to some growth. It was calculated that these proposals would bring three areas within the 2% equalisation band within a four year period, with Beta falling just outside it. In administrative terms, the concept of banding provided a pragmatic resolution of conflicting objectives. This interpretation was summarised by one of the Regional Authority Members in the following way: "this is a band of acceptability, coping with the opposing pressures of equalisation and capital developments and the general problem of the relationship between equalisation and planning".

*The significance of accounting change emerges and evolves in the context of a complex, ambiguous and changing environment*

In the introduction to this paper, it was stated that the primary aim in undertaking the research and analysis presented here was to explore what is involved in developing and implementing accounting change within the enterprise and, in particular, to discover how organizational actors come to an understanding of the meaning and implications of such change.

In general terms, the RAWP case indicates that a formal method of accounting seemed a necessary but not sufficient condition to achieve a long sought after change in Health Service policy and practice. The formula developed was undoubtedly complex, little understood by the majority but was nonetheless influential in reframing allocation discussions and redefining the financial position of different parts of the Service. The evidence suggests that it has had some impact on the distribution of resources, both within Omega and more broadly (see Maynard & Ludbrook, 1980). To achieve this, the formula appears to have had a greater measure of credibility and statistical validity than previous calculations, combined with sufficient political will and support.

Within Omega, the implementation of RAWP demonstrates that, as elsewhere, people had to work hard to understand the accounting and statistics. Moreover, the significance and implications of RAWP emerged only slowly. The weeks following the final decisions on resource allocations and assumptions were a period of much internal discussion and reflection within the Omega Region. In interviews undertaken during this time, several explanations were given for what had happened. For many outside the RTO and RHA, these two groups were regarded as having made an initial misjudgement on the relative importance of RAWP. The view expressed was that they had become too clearly committed to RAWP in a situation in which there were other competing, yet legitimate claims. As a result, they had enacted a situation to which they then had to respond. However, most of the Officers and Members who had been

closely involved felt that, whatever the statistical problems, target calculations had shown a fair approximation of the position of areas. Their support for equalisation, when combined with their desire to avoid a recurrence of public criticism of their lack of support for Beta, had encouraged them to make a definite and open commitment to acting on RAWP. Moreover, they had felt further justified in this by their expectation that regional allocations would themselves be largely established on the basis of RAWP. Only when they perceived reduced support for RAWP by the DHSS and increasing public and political pressure to open new hospitals did they begin to question the implementation of RAWP. At this point, they had taken the view that they wished to demonstrate continued support for the principles of RAWP whilst simultaneously achieving different objectives, at least in the short term. As a result, the Region had continued to frame its discussions, presentations and its decisions in terms of RAWP, although modifying the calculative process substantially through banding.

As an example of accounting change, the implementation of RAWP in the Omega Region demonstrates how the significance and implications of a calculative process emerge and develop over time. In a setting in which organization members are continuously coming to new understandings about their situation and the environment in which they work, their experience of accounting can only be understood with reference to the context in which it takes place. For the Officers and Members of Omega RHA, RAWP addressed several ongoing dilemmas in NHS decision making, apparently offering a method for resolving them. However, although the formula appeared initially to serve predominantly instrumental purposes, by providing a means to achieve the equitable allocation of resources, its significance within the Region became increasingly expressive, symbolising continued commitment to the values of fairness and justice, within the context of a particular administrative and normative order (Daft, 1983). To explore this transition, and the role of accounting as an expressive symbol, the paper will now examine RAWP from the perspective of

rhetoric, defined by Harré (1980) as the use of language for expressive purpose.

#### RAWP: THE RHETORIC AND THE REALITY

The literature on organizations draws on several sources for a consideration of rhetoric, two of which will be considered here. The first perspective adopts the discipline of literary criticism and undertakes an analysis of rhetoric as language and argument (see, for example, Huff, 1983). The other has its roots in social anthropology and examines rhetoric as the use of language for expressive purposes, exploring the multiple layers of meaning it conveys (see Harré, 1980; Gowler & Legge, 1983). Both perspectives will be adopted for this examination of the rhetoric of RAWP.

#### *RAWP as argumentation*

In undertaking her study of strategic change, Huff (1983) analysed a series of documents in terms of their structure, content and style of argumentation, together with the main themes presented in support of the arguments developed. Analysis of the written documents for RAWP, both national and within Omega, demonstrates that the case for RAWP is typically made in the three staged sequence of argument presented earlier in this paper. The reports begin by establishing that there is a general problem widely experienced in that the demand for resources exceeds their supply and is likely to do so for some considerable time. This is followed by an expression of concern that the current pattern of resource allocation has perpetuated an historic pattern of geographic inequality and that this inequality goes against one of the main principles of the Health Service: to provide for a fair distribution of resources in relation to need. The third stage in the argument concludes that what is required for the situation to alter is a satisfactory measure of need and that, when available, this should permit a change in current practice. The recurring themes within the documents concern the principle of equalisation, the need for an objective and quantitative

measure, the importance but limited availability of appropriate information as a basis for such a measure, the desirability of adopting a different way of making allocations and the recognition that the pace of change towards this will vary in different parts of the country. Within this analysis, writers acknowledge that the application of RAWP raises a number of basic dilemmas. While espousing a primary commitment to formal, open and logical analysis, the several documents constitute a dialectic between the importance of calculation versus judgement and consistency versus diversity in decision making.

Participants in Omega experienced RAWP as resurfacing a number of basic and recurring organizational dilemmas while at the same time increasing the difficulty of resolving them. Although the rhetoric of RAWP emphasised clarity, openness, reason and change, their understanding of their situation was characterised by ambiguity, caution, conflict and compromise. Change did occur, but it was perceived as environmental change gradually focussing increasing attention on the pressing need to open new hospitals. As such, in the context of Omega, it undermined rather than underlined the immediate importance of equalisation. The reality of RAWP as experienced in Omega was thus far removed from the conditions supportive of its basic reasoning. Nonetheless, in the compromise achieved and the formal presentations of this compromise, much of the argumentation and the vocabulary of formula funding remained. Rhetorical consistency was sustained throughout the allocation process although the financial consequences of the revised interpretations were substantially different from those anticipated at the outset. Analysis of RAWP as an expressive order provides a possible explanation of why this was the case.

#### *RAWP as an expressive order*

In their analysis of management as an oral tradition, Gowler & Legge explore the significance of accounting as one of several important themes in what they call "the rhetoric of bureaucratic control". This they define as "highly expressive language that constructs and

legitimizes managerial prerogatives in terms of a rational, goal-directed image of organizational effectiveness" (Gowler & Legge, 1983, p. 198). From this perspective, RAWP as rhetoric provides a language and a vocabulary for discourse, defines a set of rules prescribing the goals to be pursued and the appropriate ways of achieving them, and constitutes a way of establishing legitimacy in a highly ambiguous situation.

*RAWP as a language for discourse.* A recurring theme in this paper has been that the significance of the RAWP approach was its provision of a vocabulary and method for reconsidering the nature of resource allocation. Following the argument of Gowler & Legge (1983), the power of this vocabulary comes from its ability to translate moral aesthetic issues into techno social terms thus facilitating the task of decision makers. First, RAWP turned an apparently intractable world into a defined and limited collection of tangible variables. For example, the concept and measurement of targets reduced the overwhelming complexity of assessing health care requirements to the calculation of a single figure and, in so doing, rendered measureable the seemingly unmeasureable. Second, by substituting the concept of "population equivalent" for our every day language of people and patients, the formula obscured and diffused the huge moral and social values involved in decision making. As Gowler & Legge point out, the rhetoric of bureaucratic control "typically conflates management as a moral order with management as a technical-scientific order whilst submerging the former" (Gowler & Legge, 1983, p. 198). Now we can see the significance and value of the sequence of argumentation reviewed earlier, in which the initial appeal to the undeniable moral imperative to meet relative need is gradually translated into the more specific principle of equalisation until it ultimately appears as an essentially technical task, involving the detailed calculation of targets. Finally, by linking the economic order to the moral order, targets operate as both descriptors and evaluators of the current situation and use the apparent clarity of plain speaking to direct future behavior (Gowler & Legge, 1983). In so

doing, the language and logic of targets becomes a potentially powerful stimulus to action.

*RAWP as new rules for the game.* The analysis so far has made much of the fact that RAWP was heralded as representing a new approach to resource allocation. Thus, allocation reports within Omega were replete with statements to the effect that: "the rules of the game have changed so much that old procedures are no longer generally acceptable".

One of the early reports summarised the change thus: "Members will no doubt comprehend that the RHA is, to quote Abraham Lincoln, 'swapping horses while crossing the river', in so far as the distribution of revenue is concerned. Hitherto the RHA has deployed funds in response to identified need, whether this was specified in a long term strategy or was evidenced by more current symptoms of a problem. However, the current vogue, nationally, is for equalisation by formula: there is an urgent need, therefore, to develop a new strategy and the intrinsic methodology to accompany it, to enable the Authority to respond to the new ideology." This belief in the need to respond to the new ideology was sustained notwithstanding the change in circumstances. Thus it was that the concept of banding appeared so useful. As a method of analysis it allowed the Authority to abide by the rules, if not the total spirit, of the approach and thus provided a device for achieving an acceptable compromise between incompatible pressures and objectives. As one of the treasurers observed when discussing the need for banding: "we are playing a game with set rules and everyone is having them applied to them". To move away from the approach, so widely endorsed, would be difficult to justify and ran the risk of rendering the Region open to criticism.

*RAWP as a way of establishing legitimacy.* One of the reports in Omega describes the problem of resource allocation in the following terms: "it has to be emphasised that in the matter of resource allocation, there can never be a 'correct' answer; neither is it possible to evaluate the

effect on health care needs of the almost limitless number of factors that could be inferred to be relevant". The situation was thus perceived as one in which there were multiple and conflicting goals and for which outcomes were both difficult to measure and to explain in causal terms. At the same time, resource allocation had become a very visible process within the NHS. Indeed, some authors have suggested that one of the main benefits of RAWP was that it made the whole allocation process more visible and thus open to scrutiny (Maynard & Ludbrook, 1980). Decision makers in Omega thus found themselves in a situation combining high ambiguity with high visibility. In such circumstances, as we have already observed, the criteria for choice place as much stress on the need to avoid criticism and to do justice as on more definite achievement in relation to health care provision. This reflects the pattern observed elsewhere indicating that where the criteria for assessing performance are themselves ambiguous, organizations must resort to social tests (see Thompson, 1967; Meyer & Rowan, 1977; Meyer & Scott, 1983). Moreover, since the regions are primarily administrative bodies, with the direct provision of health care falling within the remit of the area authorities, the assessment of justice turns largely on an evaluation of administrative and procedural justice and institutionalised organizational action (Meyer & Rowan, 1977).

In this setting there seemed to the Officers to be strong grounds for sticking with the formula approach, providing as it did an apparently objective analysis while enabling, through banding, the achievement of a pragmatic political compromise. If the performance of the Region was to be judged in procedural terms, the formula approach would help structure the decision and present the necessary picture of rational analysis and reasonable behaviour expected by interested parties. In so doing, it would meet the social and political criteria of acceptability widely regarded as being so important in such circumstances (Thompson, 1967; Meyer & Rowan, 1978; Hofstede, 1981). When viewed from this perspective, perhaps the most succinct summary of the organizational implications of



RAWP was made by one of the Officers in Omega. When reflecting on RAWP's contribution to the task of resource allocation in the NHS, he suggested very simply that "RAWP is a way of stabilising the debate that you have and putting a kind of objectivity and respectability on things". As an example of accounting, it both created the agenda for debate and, although modified substantially in the course of that debate, it established through its rhetoric the legitimacy of the administrative process involved.

### CONCLUSIONS

The examination of the implementation of RAWP undertaken in this paper has been stimulated by the desire to understand more about how accounting is implicated in organizational life. The analysis suggests that the relationship between accounting and organization is a complex and intricate web of multiple connections and mutual influence evolving over time.

Both at a national level and below, the case demonstrates how the development of new accountings can play an important role in enabling organizational change. The history of NHS resource allocation indicates that the specification of a satisfactory calculation was regarded as necessary for the implementation of the long sought after equalisation policy. The RAWP formula met the apparent need for a way of quantifying an objective which it had been difficult to pursue in the absence of an agreed measure. Experience shows that it has achieved some success in redistributing resources (Maynard & Ludbrook, 1980). Accounting thus constitutes a powerful stimulus to action since it renders tangible the previously intangible, thereby both increasing the clarity and visibility of particular objectives and providing an alternative basis for administrative choice. Its development and extension into new domains has the potential for significantly redefining the context and agenda for action.

However, although the case shows how accounting changes may substantially redefine the situation to a degree which actors cannot ignore,

it also demonstrates that such changes are not sufficient to determine administrative choice. First, to become meaningful, these objectified (Berger & Luckman, 1967) accountings have to be internalised, through learning and experience. This internalisation is not a passive process but an active one in which actors attempt to make meaningful for themselves the objectifications they encounter. Second, the case of RAWP indicates that the process is an essentially reflexive one, in which the meaning of accounting both shapes and is in turn shaped by the social world. The actual impact of new accountings thus depends on the relationship between the model of reality implicit in the philosophy and methodology of the calculations and the model of reality derived from everyday experience within the enterprise. This perspective on the nature of accounting change raises important practical, methodological and theoretical issues.

First, it demonstrates how those engaged in implementing new accountings may find themselves having to work within and mediate between potentially contradictory rationales for administrative choice. In the Omega case, these contradictions were experienced most acutely by the treasurers, who had responsibility for both the accounting calculations and the presentation of options and recommendations to the RHA. On more than one occasion, the Regional Treasurer faced a direct conflict between what one administrator termed "the logic of accounting" and the "logic of the situation". For example, in preparing papers for the Authority, the Treasurer introduced several modifications to figures contained in early draft proposals, often for technical accounting reasons, such as the availability of more up-to-date information, changes in the baseline, redistribution of money between accounting categories, etc. Authority Members were, however, often reluctant to accept such changes, since they were seen to offer areas a basis from which to argue and challenge proposals. On at least one occasion, they requested that the Treasurer omit accounting modifications and reinstate the original figure. Initially, he declined to do so, arguing that the figure in itself did not mean anything, since it was essentially a

proportion of the baseline. Since the base had changed, so had the derived figure. However, this accounting logic did not dissuade the Members who stated that "the figure did mean something, because it had appeared. It should therefore remain the same". Such instances, together with the development of banding demonstrate how, instead of providing an unequivocal basis for action, accounts can themselves be shaped, even reformulated, in line with other organizational rationales (see also Gambling, 1977). Moreover, they suggest that the meaning of such accounts is both emergent and intersubjectively negotiated within a particular setting. In such settings, accountants are likely to face particular conflicts as they work at the interface between these rationales. As one administrator observed during the case presented here, "we all accept that (he) is a good Treasurer, but what we need now is a politician and not a Treasurer". It is suggested that future research could usefully explore further the conflict and ambiguity encountered by accountants, particularly in their dual roles as professionals and managers. A deeper understanding of the conditions giving rise to such conflicts and the ways in which they are resolved in practice by accountants and treasurers working in different organizational settings would further our understanding of the relationship between accounting and management.

Second, this perspective on accounting change implies that future research should continue to study the workings of specific accountings over time within particular organizational settings. If the relationship between accounting and organization is reflexive, detailed case studies are necessary to explore the dynamics of their interrelationship. As Legge *et al.* (1985) have stated, "a good case study can provide rich 'thick description' (Geertz, 1973); it can be

holistic and convey a feeling of what it is like to experience an organization, or a problem, from the 'inside'. It can explain attitudes and behaviours in context and form their actors' own frames of reference" (p. 11).

Third, and closely related, this perspective on accounting requires conceptualisations of accounting which elucidate the ways in which its meanings are created and sustained in social settings. Several such approaches have emerged in recent years (see Colville, 1981; Boland & Pondy, 1983; Roberts & Scapens, 1986). In this paper, the concept of rhetoric has been presented as a vehicle to explore such meanings and this is for three main reasons. First, rhetorical analysis draws attention to the intricacies of argumentation in which major social and moral issues become tractable through their translation into questions of accounting technique. Second, the concept of rhetoric encourages exploration of the interplay between instrumental and expressive symbolism in accounting. Despite its apparent precision, the meaning of accounting remains ambiguous, permitting multiple and sometimes conflicting interpretations to emerge over time. Nonetheless, imbued with the rhetoric of bureaucratic control, accounting symbolises a continued commitment to rational action, thereby securing wider legitimacy for administrative behaviour. Finally, such a perspective locates the study of accounting in the mainstream of interest in organizational control in which there is a strong and growing interest in management as the management of meaning (see Smircich & Morgan, 1982; Gowler & Legge, 1983). This is likely to prove an especially important line of analysis for those engaged in the theory and practice of institutionalised organizations, such as health care, in which the interplay between the rhetoric and reality of accounting is likely to be especially intriguing.

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## THE ECONOMICS OF ETHICS: A NEW PERSPECTIVE ON AGENCY THEORY\*

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### Abstract

Agency theory provides a series of instructive parables concerning the systems consequences of unreservedly opportunistic behavior. Due to a mutual lack of trust, some otherwise mutually beneficial exchanges do not take place. And, even when exchanges do take place, there are dead-weight losses due to monitoring costs and inefficient risk sharing. Therefore, in *ex ante* terms, everyone may be better off if they mutually agree to restrain their opportunistic behavior. Unfortunately, by its very nature, opportunistic behavior is not readily observed. Thus, an agreement (i.e. ethical code) to abstain from opportunistic behavior cannot be effectively enforced by external rewards or sanctions; instead, the sanctions for unethical behavior must be internalized. Hopefully, this article will stimulate ideas for incorporating ethics in discussions of accounting, using agency theory as a convenient vehicle.

The close connections between ethics and economics are nowhere more evident than in agency theory.<sup>1</sup> At the heart of agency theory, as expounded in accounting, finance and economics, is the assumption that people act unreservedly in their own narrowly defined self-interest with, if necessary, guile and deceit.<sup>2</sup> The other necessary ingredient in agency theory is the recognition that both parties to a contract often do not have the same information. For example, in an employment relationship, the employee knows better than the employer how diligently he or she has worked. The common situation in which parties to a contract have different information is called the asymmetric information condition. Agency theory is primarily concerned with describing the contracts and relationships

between individuals under asymmetric information. It has been applied to a variety of situations, such as the relationship between the owners of a firm and its chief executive and the relationship between a regulatory agency and a utility under its jurisdiction.

Is the behavioral assumption that individuals act in their own narrowly conceived self-interest with, if necessary, guile and deceit descriptively valid? Casual observation suggests that while there may be some people who are unreservedly opportunistic, others do constrain their own behavior out of an ethical sensibility or conscience. Nevertheless, agency theory serves at least two useful functions. First, to the extent that people do act in their own self-interest without conscience, agency theory can help to explain the

\*I would like to thank colleagues at the University of Washington — and particularly James Jambalvo — for their comments.

<sup>1</sup> Alchain & Demsetz (1972), Ross (1973) and Jensen & Meckling (1976) are classic agency theory papers in economics. Watts & Zimmerman (1986) summarize the agency theory literature in accounting.

<sup>2</sup> Theories of the agency relationship need not make the assumption of unconstrained opportunism. The seminal paper in the organization theory approach to the agency relationship (Mitnick, 1973) pays considerable attention the role of behavioral norms in moderating agency problems.

nature of the contracts that are observed.<sup>3</sup> Indeed, agency theory has been successfully used to explain common features of contracts such as lending agreements.<sup>4</sup> Second, agency theory can be used to provide a series of instructive parables that illustrate the adverse consequences on social and economic systems of unconstrained opportunistic behavior. As Arrow (1968, 1974, 1975), Becker (1976), Harsanyi (1976) Kurz (1977), Hirshleifer (1977) and others have pointed out, certain varieties of ethical behavior are essential for the efficient functioning of many markets. For example, Arrow (1975, p. 15) states:

It can be argued that the presence of what are in a slightly old-fashioned terminology called virtues in fact plays a significant role in the operation of the economic system ... [T]he process of exchange requires or at least is greatly facilitated by the presence of several of these virtues (not only truth, but also trust, loyalty, and justice in future dealings).

McKean (1975, pp. 30–31).

Unwritten agreements and trust (that is, confidence in each other's voluntary compliance) ... [play] pervasive roles in business and social intercourse. Written contracts in business hit only the highspots of agreements; like the bulk of the iceberg, an enormous portion of such mutual understandings is unseen ... Many small, yet in the aggregate highly significant, instances of trust exist ... without the pressure of competition or the threat of a lawsuit.

Thus, certain forms of what might be called ethical behavior (e.g. truthfulness, justice in future dealings, voluntary compliance, etc.) are necessary for efficient functioning of the economy. However, ethics is concerned with

much more than the efficiency of social and economic systems. To narrow the scope of the discussion in this paper, it would be useful to classify ethical behavior as either altruistic or ultimately utilitarian in motivation.

Altruistic behavior is motivated either by a fundamental concern for the welfare of others or by the desire to feel good by helping others. Utilitarian ethical behavior, on the other hand, has to do with voluntary compliance with rules that are, in some sense, in the individual's own self-interest. An individual obeys utilitarian ethical rules in the expectation that others will also obey the rules and that, as a consequence, systems function more efficiently and there is more to be consumed by everyone.

This paper is concerned with utilitarian ethical behavior. Altruistic behavior is real, is important and probably should be encouraged.<sup>5</sup> However, the purpose of this paper is to provide a reminder that there are sound economic reasons for at least some forms of ethical (i.e. self-constrained) behavior. Specifically, the agency theory model, which assumes unconstrained opportunism, can be used to graphically illustrate the adverse consequences of unethical behavior on the functioning of markets.

## OPPORTUNISM AND THE FUNCTIONING OF MARKETS

Providing that all exchanges between people are voluntary and marketed-mediated, all information is public, and there are no costs to transacting, the allocation of resources that results from market trading is pareto optimal (Debreu,

<sup>3</sup> Even if everyone did act ethically, agency theory would still be useful in understanding contracts if parties to a contract suspected (incorrectly) that the other parties to the contract might not act ethically.

<sup>4</sup> However, the desire of the principal to protect himself from a possibly incompetent agent is an alternative explanation for at least some of the features found in agency contracts.

<sup>5</sup> Schelling (1968) points out that if people are not very adept in choosing actions that are in their own best interests, it is unlikely that they will be more successful in choosing actions that will be in the best interests of others. To illustrate that altruism does not resolve all social dilemmas, Schelling presents an "altruists dilemma" that is the mirror image of the opportunist's "prisoner's dilemma".

1959).<sup>6</sup> That is, any departure from the allocation of resources obtained as a result of market transactions would necessarily make someone worse off.

Unfortunately, not all exchanges between people are voluntary and mediated by the market, there are costs to transacting, and not all information is public. These real-world conditions, together with unconstrained opportunism, can lead to market pathologies. Akerlof (1970) describes one of these pathologies in "The Market for Lemons". Suppose that there are random manufacturing defects in cars which substantially affect operating costs and which are difficult to detect through inspection. Through use, however, an owner can discover his own car's defects — or at least the impact of those defects on operating costs. Consider how the market for used cars would operate. Potential buyers would discount the price offered for used cars to reflect the expected excess operating costs from manufacturing defects. Suppose the price that would be offered for a defect-free used car would be \$5000 and that the average, across all cars, of the net present value of excess operating costs from defects is \$2000. Since the buyers cannot tell whether a car is free from defects or not, it would seem that the price offered for all cars would be \$3000.

However, at this price, owners of defect-free cars will tend to stay out of the used car market. Indeed, there will be a general tendency for owners who have cars with defect costs of less than \$2000 to stay out of the market and there will be a tendency for owners who have cars with defect costs exceeding \$2000 to rush into

the used car market. (In the insurance industry this is termed the "adverse selection" problem.) Thus, the price of \$3000 for a used car cannot be sustaining. Eventually, purchasers will discover that their anticipations were incorrect. In this situation, the only price that will sustain an equilibrium is a price that assumes that only the worst cars will be brought to the market by their owners. If the net present value of excess operating costs can exceed \$5000 for as many cars as are demanded in the used car market, then the market would collapse altogether and no used cars would be sold.

Note that everyone suffers from this adverse selection problem. Those who would like to sell their cars cannot, and those who would like to buy a used car are deterred by the opportunism of sellers.

Various measures can be employed to get around this problem. Mechanics can be hired to examine cars prior to purchase or they can be operated by a neutral third party long enough to estimate their excess operating costs. But these are costly and imperfect solutions. The simplest solution would be for sellers to truthfully reveal the excess operating costs of their cars. But how can this solution in which all sellers tell the truth be enforced? This central problem will be considered later in the paper.

This example illustrates that in the presence of asymmetric information and unconstrained opportunism, adverse selection can lead to the collapse of markets and/or to costly investigation. In general, markets may have problems functioning in situations where there is private information that is difficult to verify.<sup>7</sup> And the

<sup>6</sup> Pareto optimality is admittedly a weak criterion and in particular it is silent concerning the relative desirability of alternative distributions of initial resources in the economy. Thus, an economy in which there are perfect and complete markets and in which only one person is endowed with all the resources yields a Pareto optimal market solution as does a similar economy in which endowments are spread more or less evenly across individuals.

<sup>7</sup> Arrow (1975, pp. 20–22) provides an intriguing example of a peculiar form of adverse selection. Hepatitis in blood transfusions from donors who have had the disease is a serious health problem that leads to one death out of every 150 patients over the age of 40 who receive a transfusion. Hepatitis can not be reliably detected in blood samples, so the only recourse is to rely on donors to report whether or not they have had hepatitis. In one study, one half of patients undergoing cardiac surgery were given blood obtained from paid donors while the other half were given blood obtained by voluntary donors. The post-transfusion rate of hepatitis in the group supplied by paid donors was 53%, while there were no cases of hepatitis in the group supplied by voluntary donors. "A voluntary donor system is . . . self-enforcing. Anyone whose motive for giving is to help others, but who suffers from hepatitis and is aware of the implications of this, will of course refrain from giving. On the other hand, a commercial blood donor, especially one driven by poverty, has every incentive to conceal the truth."

person who has the private information may lose just as much or more than the person who does not.<sup>8</sup>

Jensen & Meckling (1976) deal with the implications of unconstrained opportunism for the organization and financing of business enterprises. They discuss the situation in which an entrepreneur raises funds by selling shares in the firm. The entrepreneur sells off most of the firm, retaining a fraction of the outstanding shares and continues as manager. The incentives for the manager to work and to consume perquisites at the firm's expense change as a result of going public. The manager gets the same benefits from avoiding work and from consuming perquisites (such as a corporate jet) whether the firm is wholly owned or only partially owned by the manager. However, the manager bears only the fraction of the cost corresponding to his share in the firm. Consequently, an opportunistic manager would work less and consume more costly perquisites after going public. If potential shareholders believe they are dealing with an opportunistic manager they will pay less for the firm than they otherwise would. Jensen & Meckling implicitly assume potential investors are willing to pay some positive price for a share in the firm. But, it may be impossible for the manager to sell shares in the firm in the face of this conflict of interests. The market for new issues of stock is subject to the same adverse selection problems as the market for used cars. If opportunities and proclivities for consumption of perquisites differ across firms and these differences are difficult for an outsider to accurately estimate, then there is a potential for adverse selection. The price offered by investors will reflect the worst possible cases, rather than the average consumption of perquisites in the economy. If opportunities for consumption of perquisites are ample, the market for new issues may collapse altogether. This is in no one's interest, least of all the entrepreneur/manager's.

If the entrepreneur could guarantee that he would not increase his consumption of perquis-

ites, everyone could be made better off. The value of the shares the entrepreneur sells should go up by an amount equal to the expected cost of the perquisites he would have consumed. The entrepreneur could then use the extra cash to buy whatever he wants. His consumption set would not have to be limited to items with at least some ostensible business rationale. The problem is that it is difficult to verify this guarantee. Absentee shareholders cannot costlessly monitor the manager's use of the corporate jet. They would find it unfeasible, even at very high cost, to monitor the amount of effort the manager puts into his job. Clever contracts can be devised that reduce conflicts of interests. Generally, however, these solutions are costly and imperfect and they result in inefficient risk-sharing. The best solution, which is costless, is for the manager to truthfully report his effort and his consumption of perquisites. But, once again, the central problem is how to enforce truthful reporting.

Jensen & Meckling point out other potential conflicts of interest that can arise within a firm. Shareholders have many opportunities to appropriate the wealth of bondholders. To take an extreme case, shareholders can pay out all of the assets of the firm as dividend just before a bond matures, leaving the bondholders with nothing. There are less blatant ways in which shareholders can be made better off at the expense of bondholders. Shareholders can "bet the firm" on a risky project. If the project turns out well, shareholders get the benefits. If the project turns out poorly, bondholders are left holding the empty bag.

Bondholders protect themselves with covenants, monitoring and a higher interest rate, but protection is imperfect and costly. It is not obvious that, in the presence of truly unscrupulous managers and shareholders, there would be anyone willing to extend credit. Again, this situation is not in anyone's interest — least of all the shareholders who would like to be able to raise capital without diluting their equity interests.

<sup>8</sup> The problem is not solved by revealing private information if there are incentives to distort the information and it is costly to verify.



While not a perfect solution, much of the bondholder/shareholder conflict of interests could be ameliorated if the manager (believably) pledges to maximize the combined value of shares and bonds.

There are other obvious, and not-so-obvious free market pathologies as well. One problem is that not all exchanges between people are voluntary — for example, burglary. The obvious cost to burglary is loss of possessions. Perhaps the greater loss is the economic and psychological cost of turning homes into fortresses. One strategy is to expend resources to catch and punish people who initiate undesired involuntary exchanges with other people, but the best solution is for everyone to agree not to engage in such undesirable behaviors.

### THE ROLE OF ETHICS

It is evident that compliance with certain rules promotes efficiency; that is, the “economic pie” is larger when certain behavioral rules are followed than when they are not followed. Hirschleifer (1977, p. 28) states with beautiful simplicity that “altruism economizes on the costs of policing and enforcing agreements”. Agency theory suggests some of the rules that could be fruitfully adopted — truthfulness in commercial transactions being the most obvious one.<sup>9</sup> Utilitarian ethical rules have the general characteristics that the individual perceives an

advantage to adhering to the rule if (nearly) everyone else also adheres to the rule.

There are at least two perspectives from which the individual can consider a proposed rule: *in vivo* (i.e. from within the living organism) or *in vitro* (i.e. from without the living organism). An *in vivo* utilitarian ethical rule is a rule that appears to be advantageous to the individual in the circumstances he finds himself in. Both the chairman of the board and the clerk in the mailroom are likely to be able to come up with sets of rules that they would find to be individually advantageous, however, those sets of rules would have little in common. And, when there is a disagreement over an ethical rule, there is little likelihood that it will be followed and hence the rule will not be sustaining.<sup>10</sup> While some *in vivo* rules are sustaining (e.g. do not poison the company’s water cooler), many other rules can be sustained only if there are frequent role reversals — the chairman of the board and the mailroom clerk periodically change places.<sup>11</sup>

This problem is of course not new to moral philosophy. Several devices have been proposed to introduce a semblance of objectivity to the selection of rules. Adam Smith posits an impartial spectator within each individual who arbitrates ethical issues. Harsanyi (1976, p. 45) has individuals select rules before they know what their situation will be. Gaa (1986, p. 438–439) describes this idea in the context of drawing up rules for the functioning of securities markets:

<sup>9</sup> Mitnick (1986) offers an interesting critique of the economics and accounting literature in agency theory from the perspective of an organization theorist in which he points out that “[m]any norms are relevant to agency; most are ignored by writers in the AFE [accounting, finance, economics] tradition. Examples of such norms are reciprocity, helping, giving, the valid-agreements-should-be-kept norm, and what I call the fiduciary norm. The fiduciary norm, which instructs the agent to act solely for the principal, is one of the coping mechanisms . . . ; it is a way for the principal to economize on specification and policing costs” (pp. 27–28).

<sup>10</sup> If everyone agrees that a particular rule would be advantageous, it *can* be a sustaining rule. This does not imply, however, that it *will* be sustaining. The question of how such rules can be enforced is left to the next section. Nevertheless, if there is a disagreement concerning the desirability of a rule, it will not be followed by everyone and those who favor the rule may eventually come to realize that the expected *quid pro quo* is not forthcoming.

<sup>11</sup> See, for example, “the poverty game” as described by Hammond (1975). In this game, there are two players who alternate between having nothing and having everything in an infinite sequence of periods. If utility is concave in consumption and goods cannot be stored from one period to the next, then there is a cooperative equilibrium in which goods are transferred from the player who has to the player who has not within each period.

The key ... is the postulation of a *representative* securities market agent who is to decide on the basic structure of that market. This is done by defining a hypothetical situation of uncertainty in which securities market agents are uncertain about their own position (i.e., as manager or investor) in the market. In Rawls's [1971] terminology, decision makers are thus forced to make decisions from behind a "veil of ignorance". The veil of ignorance idea is a theoretical device which produces a purely hypothetical situation. Its primary function is to produce a condition of so-called radical uncertainty ... by taking away from individuals any information which might enable them to identify their own position in the resulting structure. They are thus prevented from making a choice that is in their own personal interest (without regard for the interests of others).

Operating behind such a veil of ignorance, one might well agree to constrain one's own actions in exchange for guarantees from others that they would constrain their actions as well. When viewed from behind the veil of ignorance, if these guarantees could be costlessly enforced, everyone would be better off. Many of the serious systems pathologies that operate in a free market in the presence of unconstrained opportunism would simply disappear. If for example, everyone were to agree to be truthful in their business dealings, many more contracts would become possible and the very large costs involved in monitoring and inefficient risk-sharing could be avoided. Such an agreement to mutually constrain behavior could be labeled an *in vitro* utilitarian ethical code.

If enough people adhere to the ethical code, the economic pie enlarges enough to compensate for the *ex post* loss in freedom. Resources can be diverted away from monitoring, enforcing and protecting into more productive uses. The obvious difficulty is that an ethical code can be only rarely enforced in the way agreements are ordinarily enforced — by sanctions in case of an observed breach.

## HOW IS THE ETHICAL CODE ENFORCED?

In the usual agency theory model, an ethical code (a form of contract) would be enforced by rewarding compliance and punishing breaches. In some markets (e.g. the wholesale diamond market in New York City) there are seldom formal contracts; there is instead a high degree of trust among the regular participants in the market. If a trader is discovered to have acted unethically, he is excluded from the market and loses his investment in human capital. This enforcement mechanism works only when the consequences of being caught are very large. The essence of the agency problem is that it is difficult or impossible to observe the offending behavior, so when the offending behavior is observed, the penalty must be very large or there is no effective deterrent.

While explicit sanctions may be effective in some cases, there are a number of ways by which an ethical code might be enforced outside of the agency theory model.

### *Religion as an enforcement mechanism*

As Schelling (1968, p. 34) points out, an omniscient supernatural being who metes out rewards and punishments neatly resolves the problem of enforcement of the ethical code. And, it can be argued that historically religion has served such a function.<sup>12,13</sup> Durant (1959, p. 44) views the Catholic church as a civilizing force at the onset of the Dark Ages:

As the old order faded away in corruption, cowardice, and neglect, a unique army of churchmen rose to defend with energy and skill a regenerated stability and decency of life. The historic function of Christianity was to re-establish the moral basis of character and society by providing supernatural sanctions and support for the uncongenial commandments of social order.

<sup>12</sup> It would be a gross over-simplification to suggest that the only function of religion is to subdue the untrammelled opportunism of man or that this subjugation comes without cost. And certainly, not all altruistic or religious behavior is motivated by a heaven/hell calculus. Finally, apart from supplying a supernatural enforcement mechanism, religious organizations have helped to sustain behavioral norms which, as discussed later, probably are critical in enforcing ethical behavior.

<sup>13</sup> More subtly, Weber [1957] argues that the spread of ascetic Protestantism — and in particular, the idea of a "calling" to a particular life's work — provided the *psychological* conditions for the development of capitalism. Divine will ordained a fixed calling (consistent with division of labor) and pursuit of profits — but not ideal enjoyment of wealth. A materially com-

Indeed, Durant (1959, p. 360) claims that this civilizing function is common to Christianity, Judaism and Muhammadanism:

The three religions agreed in rejecting the practicability of a natural — non-religious — morality; most men, they believed can be persuaded to tolerable behavior only by the fear of God. All three based their moral code on identical conceptions: the all-seeing eye and all-recording hand of God, the divine authorship of the moral code, and the ultimate equalization of virtue with happiness by post-mortem punishments and rewards.

### *Genetics as a mechanism for reinforcing an ethical code*

Hirshleifer (1977) and Becker (1976) argue that individuals are biologically programmed to adhere to at least some parts of an ethical code. Such biological programming can be used to explain altruistic behavior within the family. For example, a gene that fosters nurturing of helpless infants will tend to be passed on. However, it is not obvious that nature will favor a gene that inhibits, for example, self-seeking calculated lying outside of the immediate family.

### *Behavioral norms and the conscience as enforcement mechanisms*

In some situations, the mutual advantages of implicit cooperation will be apparent to all parties and an implicit (but unenforceable) agreement to cooperate may emerge. The Prisoner's Dilemma is a game in which implicit cooperation is mutually beneficial. The normal form of the game (Rapoport & Chammah, 1965) is:

|           |          | Player I |        |
|-----------|----------|----------|--------|
|           |          | $C_I$    | $D_I$  |
| Player II | $C_{II}$ | $r, r$   | $s, t$ |
|           | $D_{II}$ | $t, s$   | $p, p$ |

For example, if player I selects action  $C_I$  and

player II selects action  $D_{II}$ , then player I receives the payoff  $t$  and player II receives  $s$ . The dilemma arises when the payoffs satisfy the inequalities  $s < p < r < t$  and  $r + r > s + t$  and the actions are selected simultaneously and in private by the two players. A numerical example of a prisoner's dilemma game appears below.

|           |          | Player I |         |
|-----------|----------|----------|---------|
|           |          | $C_I$    | $D_I$   |
| Player II | $C_{II}$ | 10, 10   | -10, 15 |
|           | $D_{II}$ | 15, -10  | -5, -5  |

The source of the dilemma is that both players have incentives to choose action D, but if they do, they will each be faced with the payoff -5. In contrast, if they both select action C, they would both enjoy the higher payoff 10. But a player who selects C runs the risk that the other player will select D.

The prisoner's dilemma is a simultaneous-play game with certain and symmetric outcomes; whereas agency theory situations can be characterized as sequential-play games with uncertain and asymmetric outcomes. Nevertheless, results from the prisoner's dilemma literature are suggestive. When the game is repeated many times with the same players, there is ample evidence to suggest that both players are likely to settle on action choice C. Axelrod (1980a, pp. 18-19) reports the results of two tournaments in which strategies submitted by distinguished theorists were run against each other in 200 trials of a Prisoner's Dilemma game. The winning strategy, 'tit for tat', was also the simplest strategy. The 'tit for tat' rule was to cooperate on the first move of the game and then do whatever the other player did on the previous move. In the first tournament, 'tit for tat' induced mutual

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fortable life in which one worked hard in one's calling was the ideal. "When the limitation of consumption is combined with this release of acquisitive activity, the inevitable result is obvious: accumulation of capital through ascetic compulsion to save. (p. 172)" And, "[t]he power of religious asceticism provided [the capitalist] ... with sober, conscientious, and unusually industrious workmen, who clung to their work as to a life purpose willed by God. (p. 177)" Moreover, in line with the main thrust of the present paper, ascetic Protestantism condemned dishonesty and greed, for "[c]apitalism cannot make use ... of the business man who seems absolutely unscrupulous in his dealings with others ... (p. 57)".

cooperation in at least 199 of the 200 trials of the game with ten of the fourteen competing strategies. With respect to the results of the second tournament, Axelrod (1980b, p. 379) reports that

The winning rule was once again TIT FOR TAT ... The analysis of the results shows the value of not being the first to defect, of being somewhat forgiving, but also the importance of being provokable.

Pruitt & Kimmel (1977, pp. 376–377) report that in behavioral experiments involving prisoner's dilemma games, the extent of mutual cooperation is a U-shaped function of the number of trials played.

At first, most subjects concentrate their attention on the trial at hand. Some choose D in order to exploit the other or defend themselves from his anticipated efforts at exploitation. Others choose C out of confusion or because of concern for the collective welfare and then shift to D as a reaction to the other's D playing. This leads to a period of mutual noncooperation and poor outcomes that encourage thought about the situation. At this point ... (a) each party begins to see himself as dependent on the other, (b) exploiting the other ... begins to seem hopeless, and (c) the basic choice becomes one between mutual cooperation (CC) and mutual noncooperation (DD). The result is a longer range perspective focusing on the goal of achieving mutual cooperation.

The good news is that people (and cleverly designed automated strategies) do cooperate when it is mutually beneficial. The bad news is that in these games, a period of noncooperative behavior seems to be often necessary in order to convince the players of the mutual benefits of cooperation. Pruitt & Kimmel (1977, p. 370) emphasize, however,

[E]xperimental games usually place people in an *unfamiliar strategic environment* ... [W]ell-rehearsed habits of analysis and behavior are not readily available, and subjects must innovate ... They engage in cool calculation and view their opponent in impersonal terms ... In such a setting, conventional social norms, attitudes, sentiments, and most social motives have relatively little im-

pact on behavior because they seem irrelevant to the task at hand.

It is likely that behavioral norms and ethical rules may lead to a mutually beneficial cooperative solution much more quickly than learning-by-abortive-exploitation. Furthermore, in the prisoner's dilemma games, one player always knows at the end of a round what action the other player selected; but, in the typical agency theory situation, the principal is never really sure whether the agent has been cooperating or not in any one round, so the learning occurs much more slowly. Therefore, particularly in agency theory situations, behavioral norms may be much more efficient in inducing optimal solutions than learning-by-doing.

Providing that behavioral norms are sufficiently unambiguous, it appears that they *can* be effective in facilitating exchanges between people.<sup>14</sup> For example, people tip when they are out of town at a restaurant they will never visit again. This behavioral norm resolves a specific agency problem. Service is improved if there is some mechanism for rewarding adequate service by waiters. Customers are in a better position to know the quality of service provided than even the waiter's immediate supervisor. It doesn't make sense to tip before the meal, since the customer at that point doesn't know what the service will be like. Tipping after the meal introduces a problem. Repeat customers have some incentive to tip, but one-time customers have no inherent incentive to tip. As a consequence, waiters would be reluctant to serve anyone other than regular customers and would provide only perfunctory service to anyone else. The solution is for everyone to agree to tip, if service is adequate, even when not returning to a restaurant.<sup>15</sup> This is a behavioral norm that makes market exchanges more efficient and it is enforced by a sense of guilt if violated.<sup>16</sup>

<sup>14</sup> McKean [1975, pp. 35–36] suggests that one of the conditions for an effective ethical code is that it be relatively unambiguous. "With an ambiguous rule, one does not know exactly what he is supposed to do or exactly what he can depend on others doing. In short no one knows with any precision what the social contract is or what gains can be expected from it, and it is comparatively vulnerable to erosion."

<sup>15</sup> I am indebted to Graeme Rankine for suggesting this example.

<sup>16</sup> Lynn & Oldenquist (1986) cite evidence of the existence of "group-egoistic" and "moral" motives in experiments in psychology which serve to attenuate opportunism.

Arrow (1974, pp. 26–27) underlines the central role of the conscience in efficient functioning of social systems:

Certainly one way of looking at ethics and morality ... is that these principles are agreements, conscious or, in many cases, unconscious, to supply mutual benefits ... Societies in their evolution have developed implicit agreements to certain kinds of regard for others, agreements which are essential to the survival of the society or at least contribute greatly to the efficiency of its working ... [T]he fact that we cannot mediate all our responsibilities to others through prices ... makes it essential in the running of society that we have what might be called "conscience", a feeling of responsibility for the effects of one's actions on others.

As Nagel (1975, pp. 63–64) points out, these mutual benefits are not necessarily of the narrow *quid pro quo* variety one finds in the prisoner's dilemma game.

When one person donates money to his old college, or gives blood, or gets at the end of the line to buy subway tokens, or cleans up a campsite after he has used it, he may explain such behavior by saying that he has benefited from similar behavior by others. This has the look of a straight exchange, but it is not; he benefits from like actions from others, but neither those actions nor the benefit are contingent on what he himself is doing now. And if you point out that his likelihood of receiving blood in the future if he should need it is not significantly increased by giving today, that will rightly be dismissed as irrelevant. He is not under the illusion that he is engaged in a *trade*.

What is the correct account of the motive for such behavior? It is not simple self-interest, or simple altruism either, for the explanation does refer to benefits received. The person is making a contribution to a practice or institution in the knowledge that it benefits him and is dependent for survival on contributions from people like him. He is not willing to be a free rider because it would be unfair.

Rawls (1971, p. 112) echoes this theme:

[W]hen a number of persons engage in a mutually advantageous cooperative venture according to the rules, and thus restrict their liberty in ways necessary to yield advantages for all, those who have submitted to these re-

strictions have a right to similar acquiescence on the part of those who have benefitted from their submission.

Behavioral norms (or ethical rules) are clearly a most fragile enforcement mechanism. The success of behavioral norms in enforcing utilitarian ethical behavior crucially depends upon what people think the norms are. If everyone thinks it is normal behavior to cheat and deceive, then people will cheat and deceive without feeling guilty. Not surprisingly, in prisoner's dilemma experiments it has been found that people who believe others will cooperate are more likely to cooperate themselves (Dawes, 1980, pp. 187–188).

How are behavioral norms established? The behavioral norms that are of concern in this paper are those that serve to reduce agency costs by moderating certain self-seeking behavior. It is inherently difficult to observe whether an individual is conforming to such behavioral norms or not. Hence, example has a limited role in passing on such norms. Primarily, these norms must be passed on by instruction.<sup>17</sup> Not surprisingly, in experimental games people who understand the benefits of cooperation are more likely to cooperate (Dawes, 1980, p. 190). And, apparently some sermonizing even may help (Dawes, 1980, p. 188).

Behavioral norms are probably empirically reinforced largely through the absence of counter-examples.<sup>18</sup> That is, if people are instructed that they should not steal, and they do not observe anyone stealing, they will tend not to steal.

In business organizations, management may have a key role to play in developing an organizational culture that fosters utilitarian ethical values.<sup>19</sup> A potentially testable proposition is that resources are devoted to such acculturation in

<sup>17</sup> But, the costs of instruction may outweigh the benefits of reduced agency costs.

<sup>18</sup> This suggests that shared values will be most successful as an enforcement mechanism in small, stable and homogeneous communities. In such communities, there will be fewer counter-examples to observe; and, when an individual is caught violating a shared value, the offending individual is in actuality or effect cast out of the community. Since the individual is no longer a part of the community, the individual's behavior cannot serve as a counter-example for others.

<sup>19</sup> Bolnick (1975) reports evidence from experimental sociology that group norms are powerful motivating devices — sometimes more powerful than economic incentives — and that leaders are influential in setting those norms.

direct proportion to the scale of potential agency problems inherent in the organization. For example, there should be more emphasis on fostering utilitarian ethical values in service organizations where inputs and outputs are difficult to measure than in manufacturing organizations where it is much easier to monitor performance. And, indeed, a distinguishing characteristic of professions (where the quality of the output is difficult for the consumer to assess) is an explicit ethical code.

### SUMMARY AND CONCLUSIONS

In the presence of unconstrained opportunism, economic and social systems experience profound difficulties. The agency theory literature, which assumes unconstrained opportunism, demonstrates that, at a minimum, there is a dead-weight loss from monitoring activities and from incentive contracts that do not efficiently share risk. In extreme cases, markets collapse altogether from the weight of mutual distrust.

Certain kinds of ethical (i.e. self-constrained) behavior lubricate social and economic systems. If parties to a transaction believe that the other parties to the transaction are honest and act in good faith, the transaction may be possible where it would not have been possible and dead-weight losses can be avoided. The crux of the problem is that, by definition, the probability of being caught in an unethical act is small. Thus, sanctions cannot be generally effective in inducing ethical behavior.

Historically, religion has played a role in enforcing ethical behavior by invoking an omniscient being with the power to reward and punish behavior. Genetics may also play some role in reinforcing certain ethical behaviors. In addition to sanctions, religion and genetics, shared values (or behavioral norms) probably play a critical role in motivating ethical behavior.

Business school instructors may have some influence over the values that their students take with them into the workplace. Using agency theory, the serious adverse consequences on the economic system of unconstrained opportunism can be illustrated with some force. Unfortunately, there is also much potential for negative influence on students. This is particularly true for those of us who are active in agency theory research. To a large extent, we conduct our research by grubbing around in the underbrush of business looking for evidence of opportunistic behavior and of contractual counter-measures against such behavior. We need to keep in mind that while our models presume that businessmen are opportunistic and that we can find (statistically significant) examples of such opportunism and of counter-measures taken against such opportunism, it does not follow that businessmen generally are or should be opportunistic. It would be a mistake to wittingly or unwittingly inculcate in the next generation of accountants and managers the notion that it is foolish, naive or abnormal for businessmen to feel constrained in their actions by ethical considerations. At least some varieties of ethical behavior are not to be scorned; they are a necessary lubricant for the functioning of markets.

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## AN ATTRIBUTION THEORY ANALYSIS OF TAX EVASION RELATED JUDGMENTS

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### Abstract

Traditional economic theory often has been utilized to explain tax evasion behavior. However, while economic consequences are important factors in the understanding of tax evasion behavior, they alone do not appear adequate to describe and predict the phenomenon [Lewis, *The Psychology of Taxation* (New York: St Martin's Press, 1982)]. This paper reports the results of two studies of tax evasion related judgments which builds upon tenants of attribution theory. Specifically, we examined the association between subjects' causal attributions for other's evasion behavior and their own behavioral intentions to evade. A significant association was found. The implications for tax evasion are discussed.

Tax evasion represents a major problem facing policy makers. The IRS estimates that approximately \$100 billion in federal revenues were lost in 1983 and every year since due to taxpayer underreporting of income. Attempts to explain tax evasion behavior have typically utilized economic theory. Within this theoretical framework, tax evasion behavior has been described as a function of the probability of detection and of the size of the penalties imposed (Spicer, 1974). Lewis (1982) has argued that economic factors alone do not appear adequate to describe and predict tax evasion behavior and encourages research grounded in theory developed in social psychology. More recently, the IRS has begun to encourage more behavioral research on why taxpayers engage in evasion behavior (Loftus, 1985). This paper is in response to this call for additional research.

Specifically, the objective of this paper is to provide evidence about motivators of tax evasion. That is, we seek to identify conditions which allow taxpayers to justify evasion in their own minds and thus may encourage evasion by them. One of the hypotheses examined in this paper is quite novel and potentially represents an important advance for research in tax evasion. That part of the paper assesses the extent to which the causal explanations (justifications) which people develop for others' evasion are associated with their own intentions to evade taxes. For example, if the approach has merit it may provide a relatively easy avenue for assessing the effects of programs intended to reduce tax evasion.

The research approach adopted by the authors differs from the approach commonly used in tax research. Instead of focusing on ac-



tual tax evasion, short scenarios are used to examine hypothetical cases of evasion. A limitation of research focusing on actual tax evasion is that it is a sensitive topic and taxpayers may not provide honest information (Lewis, 1982). By employing hypothetical cases, it is more likely that subjects will provide truthful responses. An additional advantage is that factors identified by theory can be manipulated while controlling other factors.

This paper reports the results of two studies which apply attribution theory to the evasion phenomenon. This research builds upon Kaplan & Reckers (1985) which also used hypothetical cases but was less theory driven. Next we provide a brief discussion of attribution theory. This is followed by a description of the experiments which were conducted; lastly the results are presented and discussed.

### ATTRIBUTION THEORY

Several principles contained within attribution theory may be helpful in formulating hypotheses about tax evasion. Kelley (1972) defines attribution theory as "a theory about how people make causal attributions." According to attribution theory, people are considered as naive scientists trying to understand the causes of events and actions around them. Heider (1958) suggests that causes of events and actions can be partitioned into two main categories, (1) dispositional, and (2) situational. In a tax evasion setting, for example, these two broad categories might be related to (1) the absence of social responsibility in the taxpayer (dispositional cause), vs (2) the inequity of the tax system and other monetary demands on the taxpayer etc. (situational causes). (This is not meant to be an exhaustive list and partition.) Jones & Davis (1965) argue that the process of distinguishing dispositional and situational factors is facilitated by consideration of intentions and situation/roles as causes of behavior. If a person acts in a manner typical of others in a particular role (e.g. politician, salesman, parent), then the action may be attributed to the role or

situation. On the other hand, if a person acts in a manner atypical of how others would act in a particular role, then the action can not be attributed to the role or situation, and therefore, it must be attributed to his/her intention. This type of information is referred to as consensus information, and indicates the extent to which one's behavior is similar to (of high consensus with) or different from (of low consensus with) others' behavior under similar conditions.

Distinctiveness information is a second type of information that may be used in making causal attributions. During a person's life, one will encounter a number of opportunities to engage in various untoward (illegal or unethical) activities, one of which is tax evasion. Highly distinctive behavior would develop if one engaged in tax evasion while not engaging in other untoward activity, whereas low distinctiveness would denote a situation in which one commonly engaged in many forms of untoward behavior including evasion. Our first two hypotheses are that tax evasion will be attributed more strongly to external (situational) causes if consensus is perceived to be high (many taxpayers are perceived to evade) and the evasion is a distinctive incidence of untoward behavior by the evader. (See Exhibit 1.)

It has been argued that the causal relevance of information also is related to background information (Mackie, 1974; Einhorn & Hogarth, 1986; Hastie, 1983). That is, the causal implications of a piece of information may be contingent upon the context in which it occurs. With regards to evasion behavior, the authors believe that information about taxpayer need and society need represent important parts of the causal background. High taxpayer need may be considered a *situational* antecedent contributing to (justifying) a decision to engage in tax evasion. Low taxpayer need would rule out an important situational antecedent and suggest that the behavior reveals something more about a *dispositional* trait.

In addition, beliefs about the needs of society have been identified by the AICPA (1983) and Von de Braak (1983) as factors contributing to tax evasion decisions. When the needs of society

## EXHIBIT 1. Research hypotheses

*Hypotheses relating to attribution formation*

1. Attributions to external environmental causes will be greater under high consensus conditions than under low consensus conditions.
2. Attributions to external environmental causes will be greater under high distinctiveness conditions than under low distinctiveness conditions.
3. Attributions to external environmental causes will be greater under conditions of high personal financial need than under low need conditions.
4. Attributions to external environmental causes will be greater under conditions of low society need than under high need conditions.

*Hypotheses relating to formation of evasion intentions*

## Primary hypothesis:

5. Greater external environmental attributions will associate with greater evasion-intentions.

## Subsidiary hypothesis:

6. Stronger beliefs that tax evasion is not immoral will associate with greater evasion-intentions.

are high, evasion will appear more deviant, and revealing about the dispositional characteristics of the taxpayer. This leads to our next two hypotheses (hypotheses 3 and 4) that relatively greater external attributions will be made for evasions when taxpayer need is high and society need is low. (See Exhibit 1.)

While the four above hypotheses regarding the formation of attributions are of interest, the manipulations relevant to these hypotheses were seeded also to provide a diffuse distribution of attributions. A heterogeneous group of attributions was desired so that the attribution-action linkage could be examined.

According to attribution theory, a person's attributions moderate the relationship between an event and one's response (see Kelley & Michela, 1980, for a review). When applied to the tax evasion context, the authors expect that one's attributions made about the evasion behavior of others will be associated with the evasion behavior of the individual. That is, if an individual believes that someone else's tax evasion behavior was driven and justified by situational forces, it is likely that the individual, if placed in that same situation, would also identify those same situational factors as "justification" for their engaging in the tax evasion behavior. However, this linkage between attributions about others' actions and our own actions may be mod-

erated by the "actor/observer bias." The bias results from an observer's tendency to underestimate the influence of situational forces relative to a person engaging in behavior (see Watson, 1982, for a review). An observer of tax evasion is likely to understate situational factors relative to the person committing the evasion or relative to if he/she committed the evasion. This may tend to weaken the observed association. Hypothesis 5 tests this association. The hypothesis states that attributions made for other's actions will be directly associated with one's own actions (see Exhibit 1).

*Ethical ideology*

Extant literature (see Lewis, 1982; Jackson & Milliron, 1986) argues for the need also to consider individual subject differences in ethical ideology when researching in the tax evasion area. Inclusion of this intuitively appealing variable further provides a benchmark against which to judge the relative influence of attributions on actions. For over 80 years (Sharp, 1898), psychologists have recognized that differences in moral judgment may be expected if the individuals making those judgments do not share ethical beliefs. Tax evasion represents, in part, a moral judgement. Thus among the factors likely to guide tax evasion decisions is one's moral beliefs regarding tax reporting responsibilities and

evasion. Previously, Kaplan & Reckers (1985) reported moral philosophy as significantly affecting subjects' behavioral intention. Their subjects, however, were undergraduate students. This study therefore included consideration of the influence of subjects' beliefs about the morality of engaging in tax evasion behavior (Hypothesis 6). See Exhibit 1 and the methodology section below.

## METHOD

Two related studies were conducted to examine the above issues. The procedure followed in each study was basically the same. A single scenario was presented to each subject. Each scenario described selected antecedent conditions and an incidence of tax evasion. The general scenario format is illustrated in the Appendix. The tax evasion behavior described in all scenarios illegally saved the taxpayer \$1600 in taxes. Subjects responded to two dependent measures and completed a post-experiment debriefing questionnaire.

Subjects participating in the two studies numbered 99 and 105. They were drawn from the membership of local community service clubs and from MBA courses. The experiment was conducted during monthly club meetings and during class time, respectively. About 65% of the subjects were service club members. Subject assignment to treatment was random. Table 1

profiles our subjects who were guaranteed individual anonymity.

### Study A

Study A employed a  $2 \times 2$  fully crossed design. The two between subject variables were taxpayer need and consensus.

*Need.* Under the high need condition, the taxpayer presented in the case was described as "very financially strapped", due to recent high family medical expenses. The same medical condition was presented under the low need condition, but the taxpayer was noted to be "not financially pressed", due to insurance coverage and financial reserves.

*Consensus.* Under the high condition, the case stated, "the frequency of tax evasion in the U.S. is great and becoming still greater. The type of evasion tactic noted in this case is especially common." Under low consensus the case stated that, "the percentage of American people who cheat on their taxes, in any material fashion, is very small. The type of evasion noted above is especially infrequent in use."

### Study B

Study B also employs a  $2 \times 2$  fully crossed design. The between subject manipulated variables were distinctiveness and society need.

*Distinctiveness.* Under the high condition, the

TABLE 1. Subjects' mean and S.D. to demographic questions

| Question                                      | Study A        | Study B        |
|-----------------------------------------------|----------------|----------------|
| It is immoral to evade<br>(five point scale)* | 3.67<br>(0.96) | 4.00<br>(1.12) |
| Age                                           | 42.3<br>(13.5) | 40.3<br>(15.0) |
| Percentage of subjects by income category:    |                |                |
| less than \$20,000                            | 6%             | 23%            |
| \$20-\$30,000                                 | 13%            | 14%            |
| \$30-\$40,000                                 | 22%            | 15%            |
| \$40-\$50,000                                 | 21%            | 16%            |
| over \$50,000                                 | 38%            | 31%            |

\* Strongly agree = 5, strongly disagree = 1.

case stated that the taxpayer is "generally regarded as an 'upright' businessman. People have come to rely on 'above board' treatment from him." In the low condition, the scenario states that the taxpayer is "generally known as a 'shrewd' businessman, not unknown to 'cut corners' when an opportunity is present."

**Society need.** Under high need, the scenario states that "tax evasion badly distorts the equity of the income tax across its citizens and necessitates higher general tax rates to recover revenue lost through evasion." Under low need, the case states that "tax evasion hardly impacts significantly on national revenues raised through the income tax".

#### *Measured variables*

Table 1 lists the measured variables considered in the study and included as part of the debriefing questionnaire. In addition to individual subjects' moral beliefs, two other variables common to tax evasion literature, namely income and age, were considered. Regarding income, subjects indicated to which of five income categories they belonged. The morality question was explicitly stated as follows: "It is morally wrong to engage in tax evasion behavior." The response scale was a five point scale bounded by "strongly disagree" and "strongly agree".

#### *Dependent measures*

Each study used two dependent variables, namely, causal attributions and behavioral intentions.

**Causal attributions.** Subjects were asked to assess the extent to which the tax evasion was a

function of the taxpayer's character or situational/environmental factors. Specifically subjects were asked to allocate 100 points to the two alternatives.

**Behavioral intentions.** Subjects were asked whether, in a like situation, they would engage in the described tax evasion behavior.

## FINDINGS

### *Causal attributions*

**Study A.** A  $2 \times 2$  ANCOVA was conducted. The independent variables were Need and Consensus. Subjects' age and income strata were covariates. [Both covariates relate to experiential background and as such are attribution theory related and have been suggested by Lewis (1982) as factors that might influence attributions.]

The results are presented in Table 2. Both manipulated factors were significant. When taxpayer need was high, the external attribution was 59% whereas when the taxpayer need was low the attribution to the environment was only 30%. Thus Hypothesis 3 is supported. External attributions also significantly varied across the levels of consensus. When consensus was high, the external attribution was 39%; when consensus was low, the attribution increased to 52%. Note, however, that these results are not in the predicted direction, and thus Hypothesis 1 is not supported. An explanation for this finding is offered later.

**Study B.** Again a  $2 \times 2$  ANCOVA was conducted. This time in addition to age and income

TABLE 2. Attribution judgments — study A

|                                    | MS        | F     | Probability |
|------------------------------------|-----------|-------|-------------|
| Covariates                         |           |       |             |
| Income                             | 405.58    | 0.47  | 0.49        |
| Age                                | 408.15    | 0.48  | 0.49        |
| Main effects                       |           |       |             |
| Individual need                    | 20,042.19 | 23.56 | 0.00        |
| Consensus                          | 3,436.96  | 4.04  | 0.04        |
| Individual need $\times$ consensus | 40.75     | 0.05  | 0.83        |

the covariates included the subjects' estimate of the percentage of Americans who evade. This new item represents a self-generated consensus factor — a factor which we attempted to manipulate in study A.

The results are presented in Table 3. Only one manipulated factor was significant, that being distinctiveness. When distinctiveness was high, the external attribution was 46% whereas when distinctiveness was low the external attribution was only 37%. Thus Hypothesis 2 is supported. Information about society need was not significant and therefore Hypothesis 4 was not supported.

The consensus covariate was also significant. Further it was consistent with an attribution perspective as stronger external attributions were made when a higher consensus condition prevailed. Thus, the influence of the measured con-

sensus factor in study B directionally conflicts with the influence of the manipulated factor in study A. This is discussed more, later.

### *Behavioral intentions*

Given the same circumstances, subjects expressed intentions as to whether they would engage in the evasion described in the scenarios; these responses served as the dependent variable in a logistic regression analysis. Logistic regression was employed because the dependent variable was dichotomous. One logistic regression was conducted on the aggregate (studies A and B) data; and two independent variables were used in the equation — causal attributions and moral beliefs.<sup>1</sup> Table 4 presents our findings. As shown, both factors significantly related to behavioral intentions thus offering support for Hypotheses 5 and 6. Expressed evasion inten-

TABLE 3. Attribution judgments — study B

|                                | MS       | F     | Probability |
|--------------------------------|----------|-------|-------------|
| Covariates                     |          |       |             |
| Consensus                      | 26,659.8 | 33.90 | 0.00        |
| Income                         | 1110.6   | 1.59  | 0.21        |
| Age                            | 231.2    | 0.33  | 0.56        |
| Main effects                   |          |       |             |
| Distinctiveness                | 3883.2   | 5.56  | 0.02        |
| Society need                   | 48.2     | 0.07  | 0.79        |
| Distinctiveness × society need | 148.96   | 0.21  | 0.65        |

TABLE 4. Behavioral intentions results of logistic regression

| Variable                | Beta     | S.E.    | Chi-square | Probability |
|-------------------------|----------|---------|------------|-------------|
| Attribution             | -0.01989 | 0.00574 | 12.00      | 0.001       |
| Morality of tax evasion | -0.52394 | 0.14499 | 13.06      | 0.001       |

<sup>1</sup> A logistic regression also was conducted employing four independent variables in the model — causal attributions, moral beliefs, subjects' age and subjects' income strata. In that analysis, subjects' income exhibits significance at 0.08. Data relevant to that analysis follow:

| Variable    | Beta     | S.E.    | Chi-square | Probability |
|-------------|----------|---------|------------|-------------|
| Attribution | -0.01882 | 0.00579 | 10.57      | 0.001       |
| Morality    | -0.58359 | 0.15476 | 14.22      | 0.001       |
| Income      | 0.02436  | 0.01385 | 3.09       | 0.078       |
| Age         | -0.00786 | 0.01409 | 0.31       | 0.576       |

tions were higher among subjects with higher external attributions and among subjects believing that tax evasion is not markedly immoral.

## DISCUSSION

The study has several limitations that should be kept in mind when reviewing and interpreting the results. First, since the subjects were not randomly selected, inferences to taxpayers in general may be inappropriate. Subjects were members of community service organizations or M.B.A. students, and it is possible that the selection process contained systematic bias. Second, the scenarios may have excluded factors relevant to the task. Thus, the results may not generalize to other settings. However, support for their attributional model has been found using several different types of settings (see Mitchell *et al.*, 1981). The results related to phase one of study A will be discussed first, then we will discuss the results of phase one of study B. Finally, we will discuss the behavioral intentions data.

The results of study A show that the tax evader's personal need exerts a strong influence on an observer's attribution of cause. That is, when an evader's financial need is high, observers tend to attribute most of the cause of the evasion behavior to situational influences. It appears that the presence of high need to our subjects provides an explanation, and perhaps justification, for tax evasion behavior.

The consensus manipulation did not produce the predicted results. Contrary to prediction, we found that high consensus produced a higher attribution to the tax evader. The authors speculate that the consensus manipulation, as operationalized, served as an indirect communication. The consensus manipulation may have also provided an indication of the severity of the tax evasion problem. Suggesting that tax evasion is a widespread occurrence that is getting worse, may also suggest that evasion represents a serious societal problem or a form of deviant behavior. On the other hand, our manipulation that tax evasion occurs infrequently may suggest that

evasion is not a serious societal problem. Our manipulation may have been more one of persuasive communication of society need than one of consensus. Evidence of the importance of consensus is provided in study B. In that study, consensus was a highly significant covariate, directionally consistent with attribution theory predictions.

The other results of study B show that distinctiveness information did significantly affect attributions but that society need did not. Still, while society need, as operationalized in study B was not perceived as an important part of causal background, we encourage further consideration of this factor. Our manipulation of society need in study B may have been too abstract to impact subjects' judgments. Our intended manipulation of consensus in study A indeed may have been a more successful, albeit unintentional, manipulation of society need.

Turning to behavioral intentions, our findings show that attributes do significantly relate to intentions to act. This represents an important finding for several reasons. First, it provides evidence that attributions serve as a link to behavior. Most prior research has tended to examine the process by which attributions are formed and only limited attention has been given to specific examination of the link between attributions and behavior (see Kelley & Michela, 1980, for a review).

The results also may be relevant to the literature relating to the "actor-observer bias". Individuals have a tendency to attribute the untoward behavior of others internally but explain their untoward behavior by reference to external factors. This may suggest that the attributions we make about others is not useful to predicting behavior about ourselves. However, our results show that attributions made concerning the behavior of others is significantly associated with our own behavioral intentions. This seems especially likely in instances where initial attributions regarding others is external. Attributions to self might be even more external but that is not to say they need be unrelated.

The implications of our findings are thus that one's behavioral intentions to evade are; (1)

directly related to (a) one's perception of the morality of evasion, and to (b) one's causal explanations (attributions) for others' behavior, and (2) indirectly related (a) to the environmental factors of need and the pervasiveness of evasion among others, and (b) to the dispositional aspect of distinctiveness. That is, evasion becomes more likely to the extent that the individual does not perceive tax compliance as a major moral issue and to the extent he/she can rationalize

that it is OK because "everyone else does it" (high consensus), "I really need the money just now" (high need), and "It's not like I'm cheating all the time" (high distinctiveness). Finally, the results suggest that hypothetical scenarios depicting others' behavior may offer not only a convenient but also a non-inhibiting vehicle to gain a greater understanding of subjects' own evasion intentions and what motivates them.

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## APPENDIX. ILLUSTRATIONS OF SELECTED CASE MATERIALS

*Study A*

Kent Wilson is married and has one son, Bob. Wilson is an electrician by trade, employed by a major construction company. Kent's wife, Karen, is a homemaker. They live in Iberia, MO, a suburb of Kansas City.

Recently, Bob, who is 13, was involved in an accident with an automobile while riding his bicycle to school. The driver of the car left the scene of the accident and as yet, has not been identified. Bob was hospitalized for a week and continues to receive therapy on an outpatient basis. Bob seems to be recovering nicely. The Wilson's financial reserves, however, have not been adequate to supplement the insurance provisions and today they are very financially strapped.

On weekends, Kent has begun to take on some part-time and neighborhood electrical jobs. When tax time came this year, Kent omitted this supplementary income from his tax return. By not reporting this cash income, Wilson illegally saved about \$1600 in taxes.

As has been discussed in the press, the frequency of tax evasion in the U.S. is great and becoming still greater. The type of evasion tactic noted in this case is especially common and a major problem for the IRS.

*Study B*

Bart and Helen Thompson were married in 1963. Bart owns and manages an apartment building in St Louis, MO. Mrs. Thompson maintains the home and cares for their two children, Susan who is 10 years old and Kevin who is 17.

For tax purposes this year, Thompson listed his 17 year old son as one of his maintenance employees. Actually Kevin has never worked in this capacity or any other. Thompson deducted as employee's salary \$4000 for part-time and summer work claimed to have been performed by his son. As a result of this illegal tax evasion, Thompson saved about \$1600 in taxes. Thompson has not done this in prior years.

Thompson is generally known as a "shrewd" business man, not unknown to "cut corners" when the opportunity presents. Thompson has never been found to be openly in violation of the law. Although neither has he been recognized as especially diligent in the conduct of his affairs.

According to a National Committee of the AICPA (American Institute of Certified Public Accountants), tax evasion on a National level presents a problem of serious concern. Tax evasion badly distorts the equity of the income tax across its citizens and necessitates higher general tax rates to recover revenues lost through evasion.





## ACCOUNTING KNOWLEDGE AND PROFESSIONAL PRIVILEGE\*

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### Abstract

Two models of the relationship between the structure of professional knowledge and the professions' access to social rewards are tested based on data on the accounting professions of 28 countries. The results support Larson's (*The Rise of Professionalism*, Berkeley: University of California Press, 1977) 'cognitive exclusiveness' theory which suggests that the professions gain rewards by standardizing their knowledge and institutionalizing the training of practitioners within universities, while simultaneously maintaining autonomy in practice.

The call to consider accounting in its organizational and social context has resulted in a rich literature which considers the ways in which accounting knowledge both shapes and is shaped by the environment in which it is embedded (Burchell *et al.*, 1980, 1985; Tinker, 1980; Tinker *et al.*, 1982). The challenge implicit in this approach to accounting is to transcend the traditional view of accounting as technique, in order to examine the use of accounting as a resource through which various groups advance their interests, and the extent to which accounting actively defines and constitutes certain aspects of reality. Accounting is, thus, seen as part of the political rhetoric of rationalized organizations and states (Boland & Pondy, 1983; Berry *et al.*, 1985; Amernic, 1985; Richardson, 1987).

The view of accounting knowledge as a purposive construction, rather than the discovery of fundamental truths, leads naturally to questions of how the knowledge is created, what form it takes, and whose interests it serves. In this article, I am concerned with the relationship

between the structure of accounting knowledge and the rewards to the profession.

In the sociological literature there have emerged two views of this relationship. On one hand, it has been argued that the privileged position of the professions in society stems from the uncertainty inherent in professional knowledge (Jamous & Peliolle, 1970; Johnson, 1977). This uncertainty allows practitioners a degree of power over clients who lack an objective benchmark against which to evaluate professional performance. On the other hand, it has been argued that professional privilege is based on the codification of professional knowledge. By creating technical rules, a profession is able to standardize the services provided and lobby for a monopoly on the basis of their mastery of certain techniques (Larson, 1977).

This question has received some attention in the accounting literature with similarly contradictory results. Hopwood (1984), for example, addressed this issue in examining the relationship between the profession and the state.

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He sees accounting knowledge as a strategic resource for managing the profession's ambiguous position as a private body with state sanctioned markets and as an agent for the implementation of public policy. Hopwood tentatively suggests (see footnote 5) that this role of accounting knowledge is based on the codification and external legitimation of that knowledge. Armstrong (1985), however, examining the role of accountants in industry, suggests that accountants have been able to dominate corporate hierarchies in comparison with other organizational professionals because their technologies for controlling labour retain a degree of discretion which they can exploit. Finally, Boland (1982) argues for a middle ground, suggesting that the knowledge base of accounting represents a mix of technology (codified knowledge) and myth (uncertainty) which has developed to manage the profession's legitimacy in the face of competing institutional demands.

In this article, two opposing sociological models of the relationship between professional knowledge and professional privilege are described and their implications tested in an accounting context with a sample of 28 countries. These models are Johnson's (1977) "service to capital" model and Larson's (1977) "cognitive exclusiveness" model. The countries included in the sample represent the intersection of Price-Waterhouse's (1975) survey of reporting practices in 46 countries and the AICPA (1975) survey of professional accounting in 30 countries which, along with Tremain's (1977) study of occupational prestige, are the major data bases used in this study (Appendix A lists the countries in the sample). The article represents the first attempt to measure the structure of professional knowledge and to use cross-cultural data in exploring the relationship between the structure of professional knowledge and the rewards to the profession.

The subsequent argument is organized as follows. The first section provides a brief overview of sociological models of the relationship between professional knowledge and the rewards to the profession. Thereafter, the second section describes the way in which the variables in these

models have been operationalized. The third section presents the hypotheses to be tested, while the next section discusses the analysis and limitations of the results. A concluding section considers the significance of the results and some implications for extensions of this study.

## SOCIOLOGICAL PERSPECTIVES ON PROFESSIONAL KNOWLEDGE

The knowledge of the professions has always been a key attribute used to distinguish professional from non-professional occupations (Millerson, 1964; Moore, 1970, pp. 233-244; Elliott, 1972, pp. 126-130). It was axiomatic that professions possessed a complex set of techniques which it took time and training to master. This is what Parsons (1968) referred to as the "primacy of the values of cognitive rationality" in the professions. The professions' mastery of these techniques linked the professions' knowledge to their rewards. Clients willingly provided social and economic rewards in return for the professions' scarce talents and services. The professions' special competence was also used to explain the professions' structure. For example, it was reasoned that lay people were unable to evaluate the performance or products of professionals so the state granted these occupations the right to control entry to the profession and to monitor members' performance. The state may even guarantee or create the market which professionals serve where it is perceived that the quantity of such services demanded by individuals would be less than is socially optimal (e.g. medicare and legal aid).

The functional theories of professional knowledge sketched above have been subject to criticism (e.g. Reuschmeyer, 1964; Barber, 1965). For example, professional knowledge, particularly in the early stages of professionalization, is not empirically more accurate or technically powerful than alternate bodies of knowledge over which it dominates (Rothstein, 1972). In some cases there is no consensus on the appropriate knowledge base of the profession and there may be no scientific basis for structuring or de-

veloping the profession's knowledge (Reuschmeyer, 1964).

In response to criticisms such as these an alternative approach developed which explored how the professions created and maintained their position in society (e.g. Hughes, 1958). This perspective suggests that the professions' knowledge is a resource which is used by occupational groups to gain power over clients and hence gain professional privileges.

The dominant thesis has been that the power of the professions stems from the uncertainty in professional knowledge. Nilson (1979), for example, argued in the general case that uncertainty allows professionals to make discretionary interpretations and applications in order to secure the approval of elites and the public, mobilize public funds for research which allows them to expand their jurisdiction and domain, and to avoid the blame for undesirable events while claiming the credit for successes. These phenomena have also been noted in accountancy. Burchell *et al.* (1985), for example, demonstrate that ambiguities in the conceptualization of value-added accounting have allowed it to be adopted by groups with radically different political objectives in an attempt to gain public support. Watts & Zimmerman (1979) have argued that accounting theory is constructed opportunistically in response to incentives in the marketplace. And Berry *et al.* (1985) have demonstrated how accounting numbers are used to maintain the appearance of productivity in an uncertain and hostile environment.

The nature of the uncertainty in professional knowledge has been modelled by Jamous & Peliolle (1970). They suggested that all occupations can be characterized by the ratio of indeterminacy to technicality in their knowledge. Indeterminacy (*I*) refers to that portion of knowledge which cannot be codified, these are practices which allow and require professional judgement. Technicality (*T*) refers to those practices which can be specified in procedures or rules. The authors claim that a high *I/T* ratio is a necessary, but not sufficient, condition for an occupation to gain professional status and privilege (see also Reiff, 1970; Nilson, 1979).

Jamous & Peliolle also argued that the lack of unambiguous outcome measures would require the external legitimization of professional status. Thus, in addition to a high *I/T* ratio, the occupation must operate in a context which grants legitimacy to the organization of knowledge in this manner and the institutions through which knowledge is acquired and competence certified. For most countries, this would imply that occupations required a combination of university based (i.e. "scientific") training programs and a high *I/T* ratio to achieve and maintain professional status (cf. Light, 1983; Richardsón, 1986).

Jamous & Peliolle's (1970) formulation was significantly altered by Johnson (1977) who suggested that indetermination will only provide an occupation with power and status where indetermination advances the interests of capital. This is essentially a theoretical specification of Jamous & Peliolle's second condition, to wit, that the system which legitimates privilege in industrial countries is capitalism.

Johnson (1977, p. 108) went on to argue, using accountancy as an example, that within any profession there will be a division of labour with one segment monopolizing the indeterminant aspects of the profession and "delegating" technical aspects to others. The profession's privileges are assumed to be dependent on the use of indetermination by a limited segment of the profession to create surplus value. Johnson argued that the auditing profession fulfilled this role in accounting. Armstrong (1985), however, also uses this proposition to argue that accountants have been able to dominate corporate hierarchies, in comparison with other professions such as engineering and personnel, because their technologies for controlling labour, i.e. expropriating surplus value, were effective and retained a degree of indeterminacy which accountants could exploit. Alternative control strategies, although powerful, could be routinized such that the professions which developed these mechanisms were unable to appropriate any of the gains.

The dominant belief in sociology that the indeterminacy of professional knowledge is the

basis for professional privilege has been challenged by Larson's (1977) detailed historical analysis of the development of the professions. Larson argued that the indeterminacy hypothesis holds for the initial stages of professionalization but the key transition from occupation to profession is brought about by the standardization of knowledge and the "production of producers". This is accomplished by institutionalizing the professions' training programs within universities and, hence, separating the knowledge of the professions from special interests.

The universities tend to develop a single, codified framework, based on "scientific" criteria of validity, on which the profession practices. The legitimization of a particular framework as the "best" available justifies granting a monopoly to practice to the profession by the state and tends to eliminate competition among segments within the profession. The key to professional status within Larson's framework is, thus, not the discretion available in professional knowledge but the ability of the profession to control that knowledge. It may be noted that the control of knowledge is regarded as an independent variable rather than a dimension of professional privilege as in the model developed by Jamous & Peliolle and Johnson. The professions' power is created at an institutional level and not through the power afforded to individual practitioners through the discretion inherent in professional knowledge.

The models developed by Johnson (1977) and Larson (1977) thus suggest contrary relationships between the degree of indeterminacy (or conversely codification) of professional knowledge and professional privilege. The question addressed here is which model best explains the privileges gained by the accounting profession in a sample of countries.

## METHOD AND DATA

The occupation of accountancy includes a broad range of tasks and occupational groups (e.g. Richardson, 1987). The focus of this paper is the auditing profession. This segment of ac-

countancy is most broadly recognized as a profession (e.g. Wilensky, 1964; Freidson, 1970) and their task is sufficiently bounded to allow the necessary empirical measures to be constructed. The relevant body of knowledge is, thus, that which guides the measurement and disclosure of the financial performance of limited liability companies through audited statements.

The models described above require operational measures of professional privilege, discretion, and the degree of institutionalization (cognitive exclusiveness) of accounting knowledge. The measures used in this study are described below.

### *Professional privilege*

Portwood & Fielding (1981) define professional privilege in terms of wealth (overall sense of well being and income), status (legal status and social respect) and power (control over the profession's own affairs). In this paper, privilege is measured in two ways. First, the privilege of accountants, relative to other occupations, in different countries is assessed using Tremain's (1977) standard international occupational prestige scale. The scale expresses the prestige accorded occupations by a sample of the population on a scale of 0–100. The scale has been found to be highly correlated with income (0.69, Tremain, 1977, p. 225) and is based on the social respect given to an occupation. Tremain provides extensive validation of this scale as a means of assessing the relative prestige of occupations across different cultures. This scale, therefore, captures much of the concept of occupational privilege.

Tremain's (1977) scale is based on 85 prestige studies in 65 countries. The data in these studies were collected during the 1960s and 1970s, however, Tremain demonstrates that prestige rankings are stable over this time period and no bias is presumed to exist in the figures used in this study. Construction of his scale required that the occupations used in other studies first be reclassified according to the International Standard Classification of Occupations (ISCO) and then scale results standardized to produce a

common metric across countries. Three accounting categories appear in the ISCO: "book-keeper", "accountant" and "professional accountant". The professional accountant is the relevant group in this article, however, the prestige rating for this group was not available for all countries. The data used are the prestige ratings for the highest qualified accounting group used in the survey of a particular country.

I justify the use of these data in two ways. First, if the more senior groups were not included in the survey of a particular country this may indicate that this group is not of sufficient size or visibility to affect public perceptions and, therefore, the lower prestige ratings are an accurate reflection of social respect for professional accountants. This is consistent with data reported in AICPA (1975) on the numbers of public accountants in those countries where data is missing. Second, a regression analysis was performed using the prestige ranking of accountants as the independent variable and prestige ranking of professional accountants as the dependent variable for those countries where data was available for both. The regression was then used to estimate the missing values of prestige of professional accountants. The reliability of these estimates, based on a jackknife procedure, was 0.80 ( $P < 0.01$ ). The resulting numbers were used in all analyses but do not significantly affect the results. The original data are used in the paper.

Tremain's data provide prestige rankings for accountants in 18 of the 28 countries used in this paper. A search of the literature produced additional rankings for Japan (Lewis & Haller, 1964; Odaka & Nishihira, 1965), the Phillipines (Voth, 1970; Bacol, 1971), Belgium (Nihan, 1973) and South Africa (Morsbach & Morsbach, 1967). These rankings were standardized according to Tremain's procedures.

A second group of measures of privilege was

constructed focusing on the notion of power and legal status. Based on the AICPA (1975) data set three variables were constructed, two measuring the extent to which the profession controlled the technology of practice, i.e. auditing and reporting standard-setting, AudStand and RepStand respectively, and the extent to which the profession had a legal mandate to perform audits, AuditVol (this is the product of two sub-scales measuring the extent to which audits were required, the "ReqAud" scale, and the extent to which a particular group of practitioners were given the right to conduct these audits, the "Restrict" scale).

These variables were scaled by developing a list of actual practices of each country in the AICPA (1975) sample which were then ranked according to the appropriate criterion by a panel of accounting academics. Those practices which could not be differentiated, as indicated by statistically insignificant differences in rankings based on cluster analysis, were combined. Scale values were then computed according to the Dunn-Rankin Variance Stable Rank Sum method (Dunn-Rankin, 1983, pp. 55–61)<sup>1</sup>. Appendix A provides examples of the practices at the endpoints of each scale. Table 1 provides the scalability index and interrater reliability scores for each of the scales used in the analysis.

#### *Professional discretion*

Jamous & Peliolle's (1970) definition of discretion is adopted in this study. The *I/T* ratio has been used as an analytic device but has never been operationalized. In order to test hypotheses on the relationship between accounting knowledge and professional privilege in accountancy, the *I/T* ratio was operationalized using the Price-Waterhouse (PW) (1975) *Survey of Accounting Principles and Reporting Practices in 46 Countries*<sup>2</sup>. The survey asked PW offices in each country to rate the presence of 264 report-

<sup>1</sup> This method is an adaptation of a two-way analysis of variance by ranks. The results are isomorphic with Thurstone's paired comparison (Case V) model but is simpler to implement. The scale is referred to as variance stable because an equal difference in scale values has the same probability of occurrence regardless of where in the scale it may occur.

<sup>2</sup> Price-Waterhouse also conducted this survey in 1973 and 1979. The 1975 data were selected as being most consistent with the data provided by AICPA (1975) and Tremain (1977) which are the other major data bases used.

TABLE 1. Scalability and reliability results

| Scale    | No. of items | Scalability index* | Interrater reliability† |
|----------|--------------|--------------------|-------------------------|
| Autonomy | 5            | 0.60               | 0.93                    |
| ReqAudit | 5            | 0.80               | 1.00                    |
| Restrict | 4            | 1.00               | 0.79                    |
| AudStand | 5            | 0.70               | 0.81                    |
| RepStand | 4            | 0.83               | 0.87                    |

\* Calculated at  $\alpha = 0.05$  with 13 judges (see Dunn-Rankin, 1983, pp. 60–61, who suggests that this may be interpreted analogously to Guttman's co-efficient of reproducibility).

† This is the interrater correlation achieved on coding practices in each country, as described in AICPA (1975), into the scale categories over 28 countries.

ing practices on a seven-point scale. Three responses indicated the proportion of companies adopting a particular reporting practice; two responses indicate that a practice is either "not found in practice" (NF) or "not applicable" (NA) due to the lack of a specific type of transaction in a country; and, two responses, "required" (R) and "not permitted" (NP), indicate that "due to law, professional pronouncement or local custom", certain practices were either mandatory or banned. In the context of Jamous & Pellolle's (1970) model, the extreme cases (*R* and *NP*) are regarded as technicalities, while cases where variation in reporting practice exist, and, therefore, professional judgement must be exercised, are regarded as indeterminacies. This treatment may understate the level of technicalities where contingent standards exist.

Nobes (1984, pp. 58–62) reports some problems with the Price–Waterhouse database. First, he points out that the database was constructed for pragmatic purposes and is based on items which will be important to day-to-day practice but not to the needs of researchers interested in international variations in accounting. This is not a concern in this study. The stability of the discretion indices (see below) indicates that regardless of the specific make-up of these practices, the extent of discretion remains relatively constant and the form of discretion index used in the analysis is based on a theoretically specified subset of practices. Second, Nobes notes that there are "misleading cases". Nobes identifies several cases where there are items which do not reflect differences in countries or

which show differences where none exist. These errors may decrease the efficiency of statistical tests based on the data but the errors are assumed to be unbiased and, therefore, should not affect the results. Nobes (1984, chapter 6) uses the Price–Waterhouse data to test his classification of international practice and finds results consistent with those based on independent data from a smaller sample of countries. Third, Nobes (1983) argues that the Price–Waterhouse data represent publically articulated rules about accounting rather than the reality of accounting practice. This observation is significant and suggests that the data are of limited utility for identifying similarities of accounting practice. The emphasis of this study, however, is on the use of accounting knowledge to support a claim to professional privilege. The linkage between this claim and accounting practice remains moot. I will return to this point in discussing the results.

Two indices of discretion were calculated from the Price–Waterhouse data, a general discretion index based on all the items in the data base and a "service to capital" index based on a subset of items of particular significance to the capital accumulation process (following Johnson, 1977). The discretion index (*D*) was computed as:

$$D = \frac{264 - (NA + NF + R + NP)}{R + NP}.$$

The index has a theoretical range of zero to infinity with higher numbers indicating a greater degree of discretion. Cases where *D* was undefined

(i.e.  $R + NP = 0$ ) were set equal to the maximum value in the sample.

### *Service to capital*

Accounting provides service to capital in two ways. It is a means by which productive processes and stocks are assigned values allowing a rational, calculative search for gains (e.g. Johnson, 1983). Accounting also serves capital by creating information which is used in the negotiation of the distribution of gains among both "risk-bearers" and with labour and the state (e.g. Tinker, 1980; Tinker *et al.*, 1982). The professional role of concern in this paper, auditing and financial reporting, is primarily concerned with the second aspect of accounting's function. It is asserted that for the population of companies affected by the knowledge base of interest (i.e. large limited liability companies), the key service to capital provided by accounting is the use of discretion to manage the disclosure of politically sensitive information about firms' performance (e.g. Watts & Zimmerman, 1986).

The extent to which discretion could be used to further the capital accumulation process was measured using an index similar in form to the discretion index described above. This index is referred to as the service to capital (STC) index. The items selected concern the disclosure of information regarding (a) the extent of corporate concentration (e.g. disclosure of intercorporate investments, non-arm's-length transactions), (b) the level of profits (e.g. disclosure of valuation and allocation policies), and (c) the distribution of profits among shareholders, employees and the state (e.g. disclosure of employee compensation and taxes). The selection of items was guided by Tinker's (1980) work on the distribution of corporate income, agency theory variables indicating the political sensitivity of the firm (Watts & Zimmerman, 1986), descriptions of areas in which auditors have violated professional norms under managerial pressure (Perry, 1984), and the corporate concentration literature (e.g. Berle & Means, 1932). The STC index has a theoretical range of zero to infinity with higher numbers indicating greater discretion on the selected items.

The reliability of the STC scale based on data from Price-Waterhouse (1973) and Price-Waterhouse (1975) was 0.863 over 25 countries. The discretion scale has a reliability of 0.79 also based on these two sources. The discriminant and convergent validity of the scales was measured by comparison with other classification systems of international accounting practice. Both scales converge with measures of the quality of corporate disclosure (Watt *et al.*, 1977) and are distinct from classifications based on cultural (Da Costa *et al.*, 1978; Frank, 1979; Arpan & Radebaugh, 1981) and economic characteristics (Mueller, 1968; Abu-Jbarah, 1972). Richardson (1985) provides details of this analysis.

### *Cognitive exclusiveness*

The degree of cognitive exclusiveness of accounting knowledge involves three aspects. First, the codification of practices must be in a form conducive to institutional pedagogy and systematic transmission between generations of practitioners. Consistent with Larson's emphasis on the linkage between the development of the professions and the market economy, the degree of codification is evaluated using the STC index described above where lower scores indicate a higher degree of codification. Second, the content of auditing knowledge, operationally defined as auditing and reporting standards, must be under the control of the profession. This is measured using the AICPA (1975) data set as AudStand and RepStand respectively (see Table 1). Finally, the transmission of the profession's knowledge must occur through universalistic institutions. This was measured by the number of years of formal training required of auditors.

The STC index is the better operationalization of the concepts of indeterminacy and codification as used by Johnson (1977) and Larson (1977) and is thus used in all analyses reported below. These analyses were replicated with the general discretion index described above with weaker but similar results. It may be inferred that it is the indeterminacy/codification of knowledge in the areas captured by the STC

index that are most important for attaining professional privilege rather than the level of discretion in general.

The correspondence between the variables specified in the models described above and their operationalization is summarized in Table 2.

nature of this relationship. Both of these models are grounded in complex historical descriptions which when specified as linear models include multiple dependent and independent variables. The primary method of analysis presented below is, therefore, canonical correlations. The predictions of these models may be stated in

TABLE 2. Theoretical and operational variables

| Theoretical                   | Operational                                                                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professional discretion       | Discretion index (Discr)<br>Service to capital index (STC)<br>Autonomy in practice (Autonomy)                                                                                                     |
| Professional privilege        | International occupational prestige scores (Prestige)<br>Restricted access to guaranteed markets (AuditVol)<br>Control of audit standards (AudStand)<br>Control of reporting standards (RepStand) |
| Formal education              | Years of university education (Formal)                                                                                                                                                            |
| Intraprofessional competition | Number of professional associations (Comp)                                                                                                                                                        |

### Control variable

In addition to the variables described above, a variable was included in the analysis to detect variations in the privilege of the accounting profession due to the nature of the economy. Historically, the accounting profession emerged during the industrial revolution due to the increasing complexity of production and, therefore, cost systems, and the separation of ownership from control. It is likely, therefore, that the profession will be in greater demand and receive greater privileges in countries which are heavily industrialized. The level of industrialization was captured by the percent of gross domestic product in agriculture, which was predicted to be negatively correlated with professional privilege.

## HYPOTHESES

The relationship of interest in this study is that between the level of indeterminacy/codification of the profession's knowledge base and the privileges gained by the profession. The models presented by Larson (1977) and Johnson (1977) make contrary predictions about the

terms of (1) the existence of a linear relationship between the dependent variate composed of multiple measures of professional privilege and an independent variate composed of variables specified within each model; and, (2) the expected sign of correlation between a dependent variate composed of multiple measures of professional privilege and the STC index as a measure of the indeterminacy or codification of professional knowledge: (following Johnson, 1977)

*Hypothesis 1 ( $H_1$ )* There will exist a significant linear relationship between a dependent variate composed of Prestige, AuditVol, and AudStand and RepStand and an independent variate composed of STC, Formal, Autonomy and GDP.

*Hypothesis 2 ( $H_2$ )* There will exist a significant *positive* correlation between a dependent variate composed of Prestige, AuditVol, AudStand and RepStand and the independent variable STC.

(following Larson, 1977)

*Hypothesis 3 ( $H_3$ )* There will exist a significant linear relationship between a dependent variate composed of Prestige, AuditVol and Comp and an independent variate composed of STC, Formal, Autonomy, GDP, Audstand and RepStand.



*Hypothesis 4 (H<sub>4</sub>)* There will exist a significant *negative* correlation between a dependent variate composed of Prestige, Auditvol and Comp, and the independent variable STC.

## ANALYSIS

The means and standard deviations of all variables are presented in Table 3 and correlations among variables are presented in Table 4.

TABLE 3. Means and standard deviations of variables

| Title    | Description                                                                      | Mean | S.D.   | Hi   | Lo   |
|----------|----------------------------------------------------------------------------------|------|--------|------|------|
| Prestige | Tremain's (1977) Standard Occupational Prestige Ranking                          | 60.5 | 8.57   | 76   | 45   |
| AudStand | The extent to which the profession controls audit standard—setting               | 63.8 | 24.87  | 86   | 2    |
| RepStand | The extent to which the profession controls reporting standard—setting           | 58.1 | 26.98  | 73   | 0    |
| ReqAud   | The range of companies required by law to produce audited financial statements   | 70.0 | 19.84  | 86   | 0    |
| Restrict | The extent to which the right to audit is restricted to particular practitioners | 41.6 | 30.61  | 73   | 0    |
| AuditVol | The volume of audit business per auditor proxied by ReqAud × Restrict            | 2931 | 2432.0 | 5767 | 0    |
| Autonomy | The extent to which an auditor is free to exercise discretion in an audit        | 49.9 | 31.78  | 79   | 10   |
| Formal   | The number of years of formal education required of auditors                     | 3.4  | 2.27   | 8    | 0    |
| Discr    | The discretion available to auditors                                             | 3.33 | 3.380  | 32   | 0.49 |
| STC      | The service to capital index                                                     | 2.70 | 2.580  | 7.3  | 0.18 |
| GDPA     | The percentage of Gross Domestic Product in agriculture                          | 10.8 | 9.10   | 42   | 3    |

TABLE 4. Correlations among variables

|          | Prestige | AudStand | RepStand | ReqAudit | Restrict | AuditVol | Autonomy |
|----------|----------|----------|----------|----------|----------|----------|----------|
| Prestige |          |          |          |          |          |          |          |
| AudStand | -0.035   |          |          |          |          |          |          |
| RepStand | -0.243   | 0.219    |          |          |          |          |          |
| ReqAud   | 0.157    | 0.149    | 0.018    |          |          |          |          |
| Restrict | 0.223    | 0.090    | 0.058    | 0.038    |          |          |          |
| AuditVol | 0.200    | 0.084    | 0.058    | 0.375†   | 0.918*   |          |          |
| Autonomy | 0.217    | -0.125   | 0.402*   | -0.048   | 0.071    | 0.061    |          |
| Formal   | 0.218    | -0.249   | -0.209   | -0.172   | -0.113   | -0.198   | -0.249   |
| Discr    | -0.273   | -0.297   | 0.128    | 0.035    | -0.046   | -0.010   | 0.237    |
| STC      | -0.629*  | -0.030   | 0.142    | -0.331†  | -0.183   | -0.202   | 0.158    |
| GDPA     | 0.177    | 0.242    | -0.238   | 0.130    | -0.048   | -0.035   | 0.169    |
| Comp     | 0.182    | -0.102   | 0.179    | -0.154   | 0.232    | 0.191    | 0.233    |
|          | Formal   | Discr    | STC      | GDPA     |          |          |          |
| Discr    | -0.194   |          |          |          |          |          |          |
| STC      | -0.038   | 0.642*   |          |          |          |          |          |
| GDPA     | -0.119   | -0.070   | -0.017   |          |          |          |          |
| Comp     | 0.122    | 0.016    | 0.313    | 0.127    |          |          |          |

\*  $P < 0.01$

†  $P < 0.05$

In order to test the hypotheses set out above, two canonical correlations were performed specified according to each of the models reviewed. These results are presented in Tables 5 and 6.

Statistically significant canonical correlations were found for both models, providing support for  $H_1$  and  $H_3$ . The model specified according to Johnson (1977) produced two significant canonical variates ( $r_1 = 0.757$ ,  $P < 0.004$ ;  $r_2 = 0.724$ ,  $P < 0.012$ ). Overall the model accounted for 34% of the variance in rewards to the profession. The relationships evident in Table 5, however, directly contradict Johnson's (1977) model. In particular, there is an inverse

relationship between the dependent variate ( $u_1$ ) and STC ( $r^2 = -0.411$ ) leading to the rejection of  $H_2$ . The model specified according to Larson (1977) produced one significant canonical variate ( $r_1 = 0.784$ ),  $P < 0.002$ ). Overall the model accounted for 24% of the variance in the rewards to the profession. The direction of the relationship between STC and the dependent variate is as predicted by the model ( $r^2 = -0.412$ ). The remainder of the analysis, therefore, focuses on the model specified according to Larson (1977) who provides a theoretical basis for the result.

In Table 6, the first canonical correlate achieves traditional levels of statistical signifi-

TABLE 5. Canonical correlations with model specified according to Johnson (1977)

(a) Canonical correlation coefficients,  $r_k$ , and redundancy analysis, Wilk's Lambda, for canonical variates

| $k$ | $r_k$ | $r^2$ | Lambda | $F$ -statistic | $df$ | Probability |
|-----|-------|-------|--------|----------------|------|-------------|
| 1   | 0.757 | 0.574 | 0.118  | 2.753          | 16   | 0.004       |
| 2   | 0.724 | 0.523 | 0.276  | 2.841          | 9    | 0.012       |
| 3   | 0.632 | 0.340 | 0.579  | 2.515          | 4    | 0.061       |
| 4   | 0.190 | 0.036 | 0.964  | 0.636          | 1    | 0.436       |

(b) Correlations between original variables and canonical variate

| Canonical variate  | $u_1$  | $u_2$  | $u_3$  | $u_4$  |      |
|--------------------|--------|--------|--------|--------|------|
| Prestige           | 0.798  | -0.057 | -0.568 | 0.191  |      |
| AuditVol           | -0.284 | -0.703 | -0.641 | 0.118  |      |
| AudStand           | -0.091 | 0.036  | -0.379 | -0.920 |      |
| RepStand           | 0.099  | -0.749 | 0.496  | -0.427 |      |
| Variance extracted | 0.184  | 0.265  | 0.281  | 0.270  | 1.00 |
| Redundancy         | 0.106  | 0.139  | 0.112  | 0.097  | 0.37 |

| Canonical variate  | $v_1$  | $v_2$  | $v_3$  | $v_4$  |      | $u_1$  | $u_2$  | $u_3$  | $u_4$  |
|--------------------|--------|--------|--------|--------|------|--------|--------|--------|--------|
| STC                | -0.543 | 0.111  | 0.801  | -0.228 |      | -0.411 | 0.080  | 0.506  | -0.043 |
| Formal             | 0.544  | 0.488  | 0.314  | 0.606  |      | 0.412  | 0.353  | 0.199  | 0.115  |
| Autonomy           | 0.552  | -0.474 | 0.317  | -0.608 |      | 0.418  | -0.343 | 0.200  | -0.116 |
| GDP                | 0.128  | 0.519  | -0.411 | -0.739 |      | 0.097  | 0.376  | -0.260 | -0.140 |
| Variance extracted | 0.228  | 0.186  | 0.252  | 0.333  | 1.00 | 0.131  | 0.098  | 0.101  | 0.012  |
| Redundancy         | 0.131  | 0.098  | 0.101  | 0.012  | 0.34 |        |        |        |        |

TABLE 6. Canonical correlations with the model specified according to Larson (1977)

(a) Canonical correlation co-efficients,  $r_h$ , and redundancy analysis, Wilk's Lambda, for canonical variates

| $k$ | $r_h$ | $r^2$ | Lambda | F-statistic | $df$ | Probability |
|-----|-------|-------|--------|-------------|------|-------------|
| 1   | 0.784 | 0.614 | 0.130  | 2.187       | 18   | 0.022       |
| 2   | 0.675 | 0.456 | 0.337  | 2.023       | 10   | 0.070       |
| 3   | 0.617 | 0.380 | 0.620  | 2.299       | 4    | 0.107       |

(b) Correlations between original variables and canonical variate

| Canonical variate  | $u_1$  | $u_2$  | $u_3$ |      |
|--------------------|--------|--------|-------|------|
| Prestige           | 0.818  | 0.566  | 0.106 |      |
| AuditVol           | -0.392 | 0.856  | 0.336 |      |
| Comp               | 0.277  | -0.186 | 0.956 |      |
| Variance extracted | 0.291  | 0.392  | 0.346 | 1.00 |
| Redundancy         | 0.179  | 0.165  | 0.132 | 0.48 |

| Canonical variate  | $v_1$  | $v_2$  | $v_3$  |      | $u_1$  | $u_2$  | $u_3$  |
|--------------------|--------|--------|--------|------|--------|--------|--------|
| STC                | -0.526 | -0.780 | 0.098  |      | -0.412 | -0.527 | 0.061  |
| Formal             | 0.623  | -0.453 | -0.124 |      | 0.488  | -0.306 | -0.077 |
| Autonomy           | 0.312  | -0.034 | 0.462  |      | 0.245  | -0.023 | 0.285  |
| GDP                | 0.279  | 0.116  | -0.611 |      | 0.219  | 0.078  | -0.377 |
| AudStand           | -0.198 | 0.343  | -0.599 |      | -0.155 | 0.232  | -0.370 |
| RepStand           | -0.368 | -0.062 | 0.258  |      | -0.289 | -0.042 | 0.159  |
| Variance extracted | 0.168  | 0.158  | 0.173  | 0.50 | 0.103  | 0.072  | 0.066  |
| Redundancy         | 0.103  | 0.072  | 0.066  | 0.24 |        |        |        |

cance. The dependent variate,  $u_1$ , is dominated by the prestige variable. The extent to which the profession has been given a guaranteed market for their services, AuditVol, is negatively related to this variate while the degree of competition among independent associations is positively correlated. Comparison of  $u_1$  and  $u_2$  suggests that social respect and the creation of guaranteed markets are independent dimensions of the rewards to the profession. The extent of competition among associations is weakly related to this variate and is discounted for the purpose of analysis. Canonical variate  $u_1$ , therefore, is interpreted as a measure of the social respect and income of the profession. The correlations between the independent variables and this variate

are the results of interest. These appear in the lower right corner of Table 6, panel b.

The rewards to the profession are negatively correlated with the extent of discretion, STC, and positively related to the amount of formal education. These results are consistent with Larson's assertion that the professions gain social rewards through the codification of their knowledge and its institutionalization in universities. The rewards to the profession are also higher where the profession has maintained autonomy in practice.

Contrary to expectations, the rewards to the profession are lower where the profession retains control over the content of their knowledge, operationalized here as control over re-

porting and auditing standards. Larson's theory was based primarily on historical evidence from professions in the natural sciences, particularly medicine. Reuschmeyer (1964), among others, has argued that the knowledge base of professions based on the natural and social sciences are not equivalent, and has suggested the need for theories of the professions which are sensitive to these distinctions. I hypothesize that the key difference is the *relative* susceptibility of knowledge in each area to political influence and the extent to which knowledge is falsifiable. Accounting knowledge, like legal knowledge, expresses the current contractual basis of society within particular spheres of activity. This knowledge, therefore, reflects the values and common practices of a culture at a particular point in time, it is not right or wrong in a factual sense, only more or less useful to those who operate within its norms. In this situation, the legitimacy of knowledge, i.e. its congruence with social values (cf. Richardson, 1987), is crucial and this can be attained most efficiently by separating the control of that knowledge base from practitioners whose rewards are dependent, in part, on the structure of that knowledge. In the natural sciences, this is less of an issue because there are stable natural phenomena against which the content of knowledge may be compared.

The relationship between the level of industrialization of a country and the rewards to the profession is also contrary to expectations. There is a positive relationship between the percentage of Gross Domestic Product in agriculture and the rewards to the profession. This implies that the profession receives lower (relative) rewards in more industrialized countries. This result probably reflects the widespread importance of industrial activity in all countries at this point in history, and the relative scarcity of trained accountants in less developed countries.

#### *Subsidiary analyses*

Two subsidiary analyses were performed. First, due to the small sample size, the canonical correlations are sensitive to violations of the statistical assumptions of the procedure. The presence and effect of outliers in the data was

tested with a jackknife procedure in which each case was sequentially withheld from the sample and the canonical correlations rerun. There were no sign reversals for the major relationships in any of these analyses. Canonical correlation also requires multivariate normality of at least one set of variables (Gittins, 1985). This was tested by observation of full factorial plots of the criterion variables taken two at a time. There were no obvious deviations from normality.

Second, the models used in this article suggest that the criterion variables should respond as a group to the predictor variables, hence the choice of canonical correlations as a means of analysis. The weightings of the criterion variables on the canonical variates (e.g. Table 6) suggest, however, that each variable represents an independent dimension of professional privilege. The results obtained through canonical correlations based on Larson (1977) were, therefore, compared with multiple regression analyses using each criterion variable as the dependent variable in separate regressions. These results are presented in Table 7.

The results confirm the existence of a statistically significant relationship between professional privilege and the structure of accounting knowledge. This result is dominated by a negative relationship between privilege (prestige) and discretion (STC), and a positive relationship between privilege and autonomy. The other independent variables do not contribute significantly to the relationship.

The other measures of dependent variables specified by Larson do not have a significant relationship with the independent variables when examined in isolation from overall social respect and rewards.

#### *Limitations*

The results of these analyses should be interpreted with circumspection. The sample used is small (although a significant proportion of the population) and the selection of countries is not random. For example, there are no communist countries in the data set and, due to the use of the Price-Waterhouse data base, are likely to represent only one sector of the world

TABLE 7. Regression analyses with each dependent variable used in the canonical correlation based on Larson (1977)

|                   | Dependent variable |                |                |
|-------------------|--------------------|----------------|----------------|
|                   | Prestige           | AuditVol       | Comp           |
| STC               | -0.579 (0.006)*    | -0.194 (0.390) | 0.187 (0.381)  |
| Formal            | 0.160 (0.410)      | -0.212 (0.972) | 0.234 (0.274)  |
| Autonomy          | 0.429 (0.060)      | 0.073 (0.780)  | 0.108 (0.665)  |
| GDP               | -0.060 (0.789)     | -0.094 (0.710) | 0.288 (0.343)  |
| AudStand          | 0.012 (0.952)      | 0.066 (0.793)  | -0.140 (0.557) |
| RepStand          | -0.331 (0.180)     | 0.101 (0.972)  | 0.228 (0.392)  |
| R-square          | 0.561              | 0.086          | 0.183          |
| Adjusted R-square | 0.386              | - 0.175        | - 0.050        |
| F                 | 3.195 (0.032)      | 0.330 (0.913)  | 0.785 (0.591)  |

\* Numbers shown are standardized beta weights, significance levels are shown in brackets.

economy. The generalizeability of the results, therefore, should not be taken for granted. The use of independent data sources, generated by several collection techniques, for each of the variables in the study should, however, strengthen the internal validity of the results.

In addition, the data are drawn from a particular time period and the stability of the relationships over time has not been established. This is particularly of concern in that both models tested were developed based on historical data and are models of the relationship between the professions and society within one culture over an extended period of time. The results may only be regarded as a test of these models to the extent that the assumptions that these processes are stable over time and cultures are valid.

## DISCUSSION

The data analysed in this article suggest that there is a strong negative relationship between the indeterminacy of accounting knowledge and the privileges attained by the profession. To rephrase this observation, the accounting profession appears to achieve its social rewards by committing itself to particular responses to accounting issues. In particular, consistent with a contracting view of accounting (e.g. Watts & Zimmerman, 1986), the profession is rewarded for the codification of practices in politically

sensitive areas. The more highly rewarded professions are providing a stable set of measures of economic activity on which external parties may base risk and profit sharing contracts.

It must be noted that the treatment of these issues may differ across countries; it is the degree of commitment and not the specific resolution of these issues which has been measured. This is not to imply, however, that accountants do not exercise judgment and discretion in their duties. Accountants deal with a complex reality and must map that reality into the reporting language which they have adopted. This process is judgmental but, as Larson (1977, p. 188) notes, "*professionalization ... makes the use of discretion predictable*" (italics in original). Accountants, in essence, are giving structure to an uncertain aspect of economic reality and are rewarded for this function (cf. Meyer, 1986; Richardson, in press).

The data analyzed here provide some additional results with respect to the use of accounting knowledge to secure professional privilege. The success of the profession in securing social rewards is enhanced by adopting formal education requirements and by ensuring the autonomy of the auditor in practice. Larson (1977) suggests that formal education is necessary to ensure the standardization of the knowledge and values of practitioners. This achieves consistency in practice even in the absence of explicit standards. It must be noted in this regard that the

the measure of discretion used in this study was based on a broad range of standardizing forces (professional pronouncements, law, custom) and is independent of the existence of codified standards for the profession. The autonomy of the profession refers to the independence of auditor judgment from review by other auditors or the state. The autonomy of an auditor may also contribute to the consistency of practice by allowing the practitioner to categorize marginal cases according to unchallenged criteria.

The data used in this article, as Nobes (1983) noted, are based on public discourse about accounting. Accounting standards, legal requirements, professional guidelines and accounting firm policies are the knowledge base used in the formal training of accountants and in public debates over the profession's claim to status and privilege. This level of analysis, however, must be clearly separated from the effects of the prag-

matic application of knowledge in concrete situations. For example, Montagne (1974) suggests that the codification of accounting knowledge gives that accountant authority over clients, i.e. a legitimate right to specify right and wrong modes of behaviour, but the uncertainty which remains in the *materiality* of events also provides the accountant with power over their clients. Revsine & Juris (1974) additionally suggest that the codification of accounting knowledge increases the demands for judgement in the design of audit plans (see also Armstrong, 1985). It is clear, therefore, that further analysis is necessary of both the role of accounting knowledge in mediating the links between the profession and society, and as the basis for relationships between accountants and their clients. It may not be assumed, however, that the dynamics at these two levels of analysis are congruent.

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#### APPENDIX A. COUNTRIES IN THE SAMPLE

|                |                          |              |
|----------------|--------------------------|--------------|
| Argentina      | Australia                | Belgium      |
| Brazil         | Canada                   | Chile        |
| Columbia       | Denmark                  | France       |
| Greece         | India                    | Italy        |
| Japan          | Mexico                   | Netherlands  |
| New Zealand    | Norway                   | Panama       |
| Peru           | Philippines              | South Africa |
| Spain          | Sweden                   | Switzerland  |
| United Kingdom | United States of America |              |
| Venezuela      | West Germany             |              |

#### APPENDIX B. PRACTICES AT THE END-POINTS OF SCALES USED IN THE ANALYSIS

| Scale    | End-point | Example practice                                                                                          |
|----------|-----------|-----------------------------------------------------------------------------------------------------------|
| Autonomy | Hi        | Audits are usually conducted by one auditor.                                                              |
|          | Lo        | Audits are usually conducted by two auditors but their opinion may be overruled by government inspectors. |
| ReqAudit | Hi        | All companies must prepare audited financial statements.                                                  |
|          | Lo        | Publicly traded companies above a certain size must prepare audited financial statements.                 |
| Restrict | Hi        | Auditors must be a member of a government sanctioned professional association.                            |
|          | Lo        | There are no explicit specifications for auditors.                                                        |
| AudStand | Hi        | The profession sets audit standards independently.                                                        |
|          | Lo        | The government sets specific audit standards.                                                             |
| RepStand | Hi        | Both the government and profession independently set reporting standards.                                 |
|          | Lo        | Reporting Standards are set by government decree.                                                         |



## A DESCRIPTIVE STUDY OF SOCIAL RESPONSIBILITY MUTUAL FUNDS

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### Abstract

This paper provides the results of a descriptive study of the socially responsible mutual funds currently existing in the U.S.A. Managers of these funds employ very similar procedures for evaluating firms with social criteria, although there was no one social criterion used unanimously. Sources of social information used varied widely from fund to fund with data provided by firms being the most frequently used. Managers believe a higher priority should be given to requiring public disclosure of data already being produced for limited distribution, e.g. EEO data.

Socially responsible investing has been the subject of considerable debate over the past 15 years. Researchers have demonstrated links between corporate social responsibility, financial performance measures, and stock market performance (Ingram, 1978; Spicer, 1978; Anderson & Frankle, 1980). The demand for social performance information by investors has been investigated (Buzby & Falk, 1978, 1979; Longstreth & Rosenbloom, 1973), and the major accounting associations have sponsored considerable research on providing corporate social information to investors (AICPA, 1972; AAA, 1972–1976; NAA, 1974, 1976). Despite these efforts, the state of social reporting in the U.S.A. remains unchanged — strictly voluntary on the part of corporations.

Although the reporting of social information has not progressed, the use of social information in investment decisions appears to be growing. Socially responsible mutual funds, many of which were founded in the early 1970s, amid predictions of failure, have survived and are increasingly in demand. Reports indicate that these funds have grown significantly in the past five years and currently have assets totaling over \$50 billion (Martin, 1986). The ever-increasing pressures for divestiture from companies doing business in South Africa coupled with pressures

for divestiture from nuclear-related firms have brought about further interest in socially responsible mutual funds. The purpose of this paper is to examine these mutual funds from the standpoint of their investment policies, criteria for investments, information sources, and resulting portfolios. There are eight mutual funds in the United States which represent themselves as being socially responsible investors. This paper presents results of an in-depth survey of these funds. This study provides initial detailed information on socially responsible mutual funds, the results of which will be useful in understanding social investing models and in assessing whether mandated social accountability by corporations is warranted.

The next section of the paper provides a review of the related literature. The third section describes the research method employed. Results of the study are presented in the fourth section, followed by conclusions and directions for future research.

### BACKGROUND AND RELATED RESEARCH

Mutual funds dedicated to socially responsible investing offer investors a portfolio of stocks which conform to the criteria of being "good"

social performers, as well as "good" financial performers. These funds often have been referred to in the accounting literature and have been cited as part of the justification for many empirical, investor-oriented social accounting studies, but the funds have never been examined. We believe that an understanding of the actual investment policies, information needs and information sources of these funds is an essential step in the development of social accounting. This information will provide a basis for further interpretations of previous social accounting research and will provide initial data on socially responsible investment strategies that will enable the accounting profession to address the issue of social performance information needs of investors.

Previous accounting literature has recognized social investing from an economic rather than from a moral view. Focus has been on the relationship between social and financial performance of firms based on the existence of externalities. Externalities are defined as costs and benefits of corporate activities that extend to the public in general and are not assumed by the corporation. The early literature (Estes, 1972, 1976; Mobley, 1970; Ramanathan, 1976) developed models of social accounting stressing the need for social accountability by corporations because information on externalities could be relevant to investors, since externalities may result in future claims against the firm. The view of a wider corporate constituency than investors further supported the need for social accountability by firms both from an economic and from a moral view (e.g. Cooper & Sherer, 1984), but the predominant constituent group empirically examined in the literature has been the investor.

Spicer (1978) found a positive relationship between better environmental performance and measures of financial performance, suggesting that environmental performance information is relevant to investment decisions. Shane & Spicer (1983) found a significant association between the release of environmental information by the Council of Economic Priorities and the security price movements of the firms included in their study. Companies with lower environmental

rankings had significantly greater negative abnormal returns, again suggesting a relationship between social performance and financial performance.

Social information presented in annual reports has been associated with security market returns in several studies. Anderson & Frankle (1980) demonstrated that voluntary social disclosures possessed information content as reflected in security market returns and that the security market valued these disclosures positively. Ingram (1978) found that firms which made social disclosures outperformed non-disclosing firms in the securities market. Numerous other studies (for a review of these studies, see Ullman, 1985) also have demonstrated the relationship between social and financial performance. Thus, from prior research results, the existence of mutual funds that invest solely in socially responsible companies should not be unexpected.

In this paper the following research questions regarding socially responsible mutual funds are examined:

- (1) What processes of selecting firms for inclusion in the portfolios are utilized by socially responsible funds?
- (2) What criteria do socially responsible funds employ in evaluating social performance?
- (3) How do socially responsible funds monitor the firms in their portfolio for social performance?
- (4) On what sources of information do socially responsible fund managers rely for their portfolio decisions?
- (5) What companies are included in the socially responsible portfolios?
- (6) How do socially responsible fund managers perceive the need for social reporting by corporations?

## RESEARCH METHODS

### *Participants*

The eight mutual funds identified as socially responsible funds by the financial press (*Business Week*, 1985; Funding Exchange, 1983; Mar-

tin, 1986) were surveyed. A list of these funds is in the Appendix. The portfolio manager of each fund was sent a letter introducing the researchers and explaining the nature of the research project. Each fund's portfolio manager was then telephoned two weeks later and asked if he/she would participate in the study. All agreed to participate, and questionnaire packets were mailed to each manager.

### *Instrument*

A three-part questionnaire was developed for the study.<sup>1</sup> The first part of the questionnaire was designed to obtain information regarding the funds' investment selection processes, including information sources utilized and portfolio compositions. This part of the questionnaire included 17 sections in which participants were asked to describe different aspects of their investment procedures. These sections addressed the first five research issues identified in this study. The sixth research issue was addressed in the second part of the questionnaire. This part was designed to ascertain participants' attitudes toward social responsibility disclosures by companies and the perceived need for further corporate social accountability. The third part of the questionnaire asked for basic demographic data about the participants.

## RESULTS

Six fund managers returned completed questionnaires with responses to the majority of questions. One fund manager returned the questionnaire but provided responses only to questions two and five. One fund manager did not respond. In follow-up contacts this manager indicated his intention to return the questionnaire, but it was never received.

The demographic items contained in the third part of the questionnaire showed that the responding managers averaged 8.4 years of experience as fund managers (range: 3–15 years). Fifty percent had managed only social responsibility

funds. Ages of the managers ranged from 29 to 65; the average age was 44.5. Only one manager had more than 12 credit hours of formal accounting training.

Results of the questionnaire are presented below in the order of the research questions previously outlined.

### *Selection process*

The first research question pertains to the selection process the socially responsible funds use for investments in their portfolios. This process was described by responses to the following questions:

1. When evaluating firms with your social criteria, which of the following best describes the process you use:

(a) To be included in the portfolio a firm's performance on each of the criteria are weighted by the importance of the criteria and an aggregate "score" is derived. A firm must achieve a minimum score to be included. A high value on an important criterion will offset low values on less important criteria.

(b) To be included in the portfolio a firm's performance on each criterion must meet some minimum level. If a firm fails to meet the minimum on any criterion, it is excluded.

(c) To be included in the portfolio a firm's performance on at least one criterion must be outstanding. Firms are selected on the basis of the criterion upon which they perform best.

(d) Some other process. Please describe.

2. In selecting firms for your social responsibility portfolio are financial criteria more important, of equal importance, or less important than social criteria?

3. When deciding on which firms to include in your social responsibility portfolio do you:

(a) select first on social criteria then on financial criteria;

(b) select first on financial criteria then on social criteria;

(c) select on both criteria considered simultaneously?

4. Does good financial performance offset

<sup>1</sup> A complete copy of the questionnaire may be obtained from the authors.

weaker social performance? Explain.

5. Does good social performance offset weaker financial performance? Explain.

Five of the six fund managers who responded to these questions described their process of evaluating firms with social criteria as most like item (b) of question 1, a conjunctive model for selecting firms on social criteria. This result may be expected, given the observed phenomenon of self-reporting complex decision processes (Ashton, 1982, p. 20).

More variability in responses among fund managers occurred when they were asked to describe their application of *both* social and financial criteria in the selection of securities (question 2). Half the respondents weighted financial and social criteria equally important in the selection process. One manager indicated that social criteria were more important, one that financial were, and another indicated that social criteria were employed in such a way that the two did not compete in importance.

The order in which criteria were employed in the selection process also varied among managers (question 3). Three managers indicated that they selected securities on financial criteria before evaluating the social criteria; two utilized the criteria in opposite order; one manager indicated that financial and social criteria were applied simultaneously. These different sorting strategies may be a contributing factor to the lack of commonality among the portfolios of the funds (reported below).

Whether managers make tradeoffs between social and financial performance was addressed in questions 4 and 5. Half the managers indicated such a tradeoff was not possible, i.e. they did not use a compensatory strategy for selecting on both financial and social criteria. Two managers declined to respond to these questions. One manager indicated such a tradeoff was possible and cited as an example the case in which an excellent social performer is excluded because of poor financial prospects. This response is contrary to the sense of the questions, since the response indicates poor offsets good whereas the questions specifically ask if good offsets poor. Thus, overall it appears that social responsibility

fund managers do not employ a compensatory scheme, (i.e. both dimensions of performance must meet some minimum acceptable level) in their security evaluations.

### *Criteria*

The second research question involves examinations of the criteria social responsibility fund managers use in determining social performance of firms. A complete list of criteria that the fund managers indicated they employ in evaluating the social responsibility of firms is presented in Table 1. Managers of all seven responding funds provided this information. The first column of the table contains the generic labels of the dimensions of corporate performance these managers evaluate when selecting socially responsible firms. The second column contains the number of funds which use each criterion. Column three contains the number of responses listing the criterion positively, i.e. if the firm does a certain thing, it is socially responsible. Column four contains the number of responses listing the criterion negatively, i.e. if the firm does a certain thing, it is not socially responsible. The number of positive and negative listings combined does not total the amount in column two because some managers cited more than one specific criterion associated with a generic label. For example, in the category "Treatment of Employees," five managers use some aspect of it as a social responsibility criterion. Within that category, three responses cited fair labor practices in a positive way. Three others cited fair labor practices in a negative way; one respondent indicated that National Labor Relations Board violators or firms engaging union busting consultants would not be considered socially responsible. These results show that fund managers seek information about both positive and negative elements of a firm's behavior.

The social criteria the funds listed varied from being general to very specific (for example charity was listed as a general criterion, while under miscellaneous criteria "violators of section 8 of Export Administration Act of 1979" was identified).

No social criterion was listed by all respon-

TABLE 1. Criteria for evaluating social responsibility

| Column 1                                                                  | Column 2              | Column 3                  | Column 4                  |
|---------------------------------------------------------------------------|-----------------------|---------------------------|---------------------------|
| Criterion                                                                 | Number of funds using | Number listed as positive | Number listed as negative |
| 1. Equal employment opportunity (particularly women and minorities)       | 5                     | 5                         | 1                         |
| 2. Treatment of employees:                                                | 5                     |                           |                           |
| Safety and health                                                         |                       | 2                         |                           |
| Participatory management                                                  |                       | 2                         |                           |
| Fair labor practices                                                      |                       | 3                         | 3                         |
| Pay and benefits                                                          |                       | 2                         |                           |
| 3. Environmental protection                                               | 6                     | 3                         | 4                         |
| 4. Consumer protection/product purity                                     | 3                     | 3                         |                           |
| 5. Innovation/quality of life enhancing technologies products or services | 4                     | 4                         |                           |
| 6. Involvement with nuclear power                                         | 3                     |                           | 3                         |
| 7. Defense contracts/weapons development                                  | 4                     |                           | 4                         |
| 8. Business with repressive regimes, notably South Africa                 | 5                     |                           | 5                         |
| 9. Charity                                                                | 2                     | 2                         |                           |
| 10. Alcohol, gambling, or tobacco                                         | 2                     |                           | 2                         |
| 11. Special economic or social contributions to the community             | 2                     | 2                         |                           |
| 12. Miscellaneous:                                                        | 1                     |                           |                           |
| Violators of section 8 of Export Administration Act of 1979               |                       |                           | 1                         |
| Drain capital from U.S.A.                                                 |                       |                           | 1                         |

dents; however, environmental protection was mentioned most frequently, cited by all but one manager. Three other criteria, equal employment opportunity, treatment of employees, and business relations with repressive regimes, were listed by five of the seven managers. Product innovation and defense/weapons development were also listed by a majority of managers. Thus, these six criteria appear to constitute the minimal profile for evaluating corporate social responsibility among these funds.

Reasons given by respondents for believing that the social criteria they cited were indicative of social responsibility varied. Three of the managers indicated that the criteria they used were appropriate because they were related to circumstances affecting the quality of human existence. These funds equated social responsibility directly with actions that affect human well-being. Similarly, another manager justified criteria on the grounds that they represented issues of primary concern to U.S. citizens. Another manager stated that his criteria defined "good"

socially responsible companies that in the long run could be expected to be more profitable — a "making money by doing good" argument that is consistent with the externality literature. The remaining respondent claimed his criteria reflected the moral concerns of the funds' principal customers, religious conservatives. One manager did not provide reasons.

When asked if the funds' social criteria changed over time, the managers indicated that changes in social criteria occur infrequently and generally are minor. Although five of the six respondents indicated that their criteria had changed, only one fund changed a general criterion. This fund added involvement with nuclear power as a negative criterion. The remaining changes were variations in applications and scope of specific criteria listed under general criteria. Such changes included further restrictions on companies doing business in South Africa, a more inclusive definition of firms doing "defense" work, and an expansion of certain evaluation procedures (e.g. equal employment

equal employment opportunity was redefined to include comparable worth). Thus, even with the recent apparent change in America's political and social climate, the social criteria employed in investment analysis remain constant.

### *Monitoring*

The third research question is what procedures do the funds employ to monitor social performance of their portfolio firms? Results show that re-evaluations of firms included in social responsibility portfolios are done "regularly" by two of the fund managers and "continuously" by the four others. One of the firms that re-evaluated regularly evaluated all firms every three to five years; the other performed an annual review of all firms. All respondents indicated that the social criteria used for initial selection were the same criteria used to monitor firms once included in the portfolio.

The major event cited by managers as triggering a re-evaluation of a firm was the availability of new information about the firm's social behavior. Sources of such new data explicitly mentioned were news articles or government publications. Other events that prompted re-evaluations were news of mergers, takeovers or acquisitions, news of new product lines being introduced, and inquiries from shareholders or other interested parties.

### *Sources of information*

The fourth research question asks for the sources of social responsibility information utilized by the mutual funds. The information sources these fund managers rely upon for evaluating social criteria varied considerably. The lists provided varied in length from as few as three sources to as many as 24; there was also variability in the specificity of source description. Table 2 contains a summary of responses by general source categories.

Under each general source the specific infor-

mation sources cited are listed along with the number of fund managers indicating that particular source. The two general sources cited by all managers were companies themselves and government agencies. Of all specific sources cited, annual reports and personal contact with company personnel were the most frequently mentioned. However, the counts on specific sources must be interpreted with caution since the same source may be labelled differently across funds. For example, one manager cited "companies themselves." This could include annual reports, SEC filings, interviews with management, etc. In the preparation of Table 2, very little aggregation was done. Unless two citations were virtually identical, they were treated as separate items.

Given these qualifications, there was little multiple citing across funds. Of the 47 specific information sources noted, 33 were cited by only one fund, 11 were cited by only two funds, one by three funds, and two, as previously noted, by four funds. The apparent lack of commonality is not surprising, since the funds varied in their reasons for believing their criteria were indicative of social performance and there are few widely published sources of corporate social performance information for the funds to utilize. Also, the differences in emphasis and conceptualizations of social performance may be significant in explaining the numbers and kinds of information sources cited. This different concept of social responsibility was also reflected in the pattern of multiple information source citings. Fourteen items were cited by more than one fund. In 11 of those cases, two of the funds were always paired. These funds' reasons for believing in their social criteria indicated a humanistic concept of corporate social responsibility. However, these two funds also provided the longest lists of data sources, thus affording more opportunities for matches.<sup>2</sup> In addition, among the remaining multiple citings, one of these two funds

<sup>2</sup> The extensiveness of the data search by these two funds may be significant in its own right. Whether the lengthiness of their responses, relative to those of the others, is because they actually do utilize more socially relevant information or because they took our questionnaire more seriously, the conclusion is the same: these two fund managers are more zealous about social responsibility investing.

TABLE 2. List of sources of social information

| Source |                                                                                                                                       | Number of<br>funds citing<br>general source | Number of<br>funds citing<br>specific<br>source |
|--------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|-------------------------------------------------|
| I.     | Companies                                                                                                                             | 6                                           |                                                 |
|        | 1. "Companies themselves"                                                                                                             |                                             | 1                                               |
|        | 2. Personal knowledge or contact with management                                                                                      |                                             | 4                                               |
|        | 3. Annual Reports                                                                                                                     |                                             | 4                                               |
|        | 4. Reinvestment Act Statements                                                                                                        |                                             | 1                                               |
| II.    | Government                                                                                                                            | 6                                           |                                                 |
|        | 1. EEOC publications                                                                                                                  |                                             | 1                                               |
|        | 2. Government officials and publications                                                                                              |                                             | 1                                               |
|        | 3. SEC filings, e.g. 10 K's                                                                                                           |                                             | 2                                               |
|        | 4. House South Africa Committee Report: "U.S. Business Involvement in South Africa"                                                   |                                             | 1                                               |
|        | 5. Data through Government Associations                                                                                               |                                             | 1                                               |
|        | 6. Department of Defense, e.g. "Directorate for Information, Operations, and Reports"                                                 |                                             | 2                                               |
|        | 7. EPA, e.g. "Source Compliance List," <i>Water Administration Orders</i> , hazardous waste "Compliance List," <i>Quick Look List</i> |                                             | 2                                               |
|        | 8. Department of Labor                                                                                                                |                                             | 1                                               |
|        | 9. OSHA                                                                                                                               |                                             | 2                                               |
|        | 10. Department of Justice: List of Clean Water Act cases                                                                              |                                             | 1                                               |
|        | 11. Personal contact with regulatory agencies                                                                                         |                                             | 1                                               |
|        | 12. BACOSH: <i>Occupational Health News</i>                                                                                           |                                             | 1                                               |
| III.   | Industry/trade organizations                                                                                                          | 4                                           |                                                 |
|        | 1. Trade magazines                                                                                                                    |                                             | 1                                               |
|        | 2. Data from industry associations                                                                                                    |                                             | 1                                               |
|        | 3. AFL/CIO                                                                                                                            |                                             | 2                                               |
|        | 4. Personal contact with unions                                                                                                       |                                             | 1                                               |
|        | 5. Bureau of National Affairs publications                                                                                            |                                             | 2                                               |
| IV.    | Private social responsibility organizations/publications                                                                              | 4                                           |                                                 |
|        | 1. Franklin Research "Insight"                                                                                                        |                                             | 3                                               |
|        | 2. Project Equality Reports                                                                                                           |                                             | 1                                               |
|        | 3. Investor Responsibility Research Center, e.g. <i>The Nuclear Weapons Industry, South African Review Service</i>                    |                                             | 2                                               |
|        | 4. The Data Center                                                                                                                    |                                             | 2                                               |
|        | 5. "Good Money" publications                                                                                                          |                                             | 2                                               |
|        | 6. "Inform" Reports                                                                                                                   |                                             | 1                                               |
|        | 7. Interfaith Center on Corporate Responsibility                                                                                      |                                             | 1                                               |
|        | 8. Council on Economic Priorities                                                                                                     |                                             | 1                                               |
|        | 9. <i>Concerned Investors Guide</i>                                                                                                   |                                             | 1                                               |
|        | 10. American Friends Service: <i>Top 100 Defense Contractors</i>                                                                      |                                             | 2                                               |
|        | 11. Mid-Pension Conversion Project: <i>California Top 12 Military Contractors FY 1982</i>                                             |                                             | 1                                               |
|        | 12. Nuclear Free America: <i>Major Nuclear Weapons Contractors, 12/83</i>                                                             |                                             | 1                                               |
|        | 13. Nus Corp.: <i>Commercial Nuclear Power Plants</i>                                                                                 |                                             | 1                                               |
|        | 14. Pacific Northwest Research Center: <i>Unified List of U.S. Companies in South Africa and Namibia</i>                              |                                             | 1                                               |
|        | 15. Centre Against Apartheid: <i>Bank Loans to South Africa 1979-mid-1982</i>                                                         |                                             | 1                                               |
|        | 16. Foundation Center: <i>Annual Record of Corporate Giving</i>                                                                       |                                             | 1                                               |
| V.     | Business publications                                                                                                                 | 3                                           |                                                 |
|        | 1. Value Line Survey                                                                                                                  |                                             | 1                                               |
|        | 2. Wall Street Journal                                                                                                                |                                             | 1                                               |

TABLE 2. List of sources of social information (continued)

| Source |                                                     | Number of<br>funds citing<br>general source | Number of<br>funds citing<br>specific<br>source |
|--------|-----------------------------------------------------|---------------------------------------------|-------------------------------------------------|
|        | 3. Forbes                                           |                                             | 1                                               |
|        | 4. Investment publications                          |                                             | 1                                               |
|        | 5. Stock related newsletters                        |                                             | 1                                               |
| VI     | Miscellaneous                                       | 3                                           |                                                 |
|        | 1. <i>100 Best Companies to Work for in America</i> |                                             | 2                                               |
|        | 2. <i>Everybody's Business</i>                      |                                             | 1                                               |
|        | 3. Various other reports and publications           |                                             | 1                                               |
|        | 4. General readings                                 |                                             | 1                                               |
|        | 5. Sullivan's list of companies in South Africa     |                                             | 1                                               |

was always included as one of the pairings.

The rankings of data sources, which were requested of the managers, indicated no consensus. Three of the respondents did not attempt to rank order the sources, but replied that all were equally important. The three others did provide rankings, with company sources listed as the most important. One of these managers indicated that companies were the only useful source of data with which to assess social performance. Thus, companies themselves appear to be one of the most significant data sources for social information.

### Portfolios

The fifth research question deals with the content of investment portfolios of the social responsibility funds. The fund managers provided lists of firms included in their portfolios at the ends of the most recent accounting years. Of the six lists provided, three were dated 30 June 1985, one 31 May, one November 1985, and the remaining one, 30 April 1985. Although only three with the same year-end dates are strictly comparable, comparisons across all six funds are reliable to the extent that there is a degree of stability within the firms included in the portfolios over time.

The three funds which had other than 30 June dates provided portfolio lists for at least one year prior to their 1985 list. For the 31 May fund, the annual retention, (i.e. the number of firms staying in the portfolio for an entire year), was 68% for the year ended 31 May 1985. Of the firms leaving the portfolio, none were included in any of the other funds' portfolios as of their 1985 year endings. The 30 November fund had an annual retention of 72% for 1985. Of the firms dropped, five were common to some other portfolio as of its 1985 end. The 30 April fund had an annual retention of 76% for 1985. The effect of these changes on the comparisons of portfolios made below is toward less commonality among the funds. Since all three funds had basically stable membership for 1985, comparisons were made of all six portfolios.<sup>3</sup>

For the periods ending in 1985, the funds listed a total of 193 different companies in their portfolios. Only seven companies (3.6%) were included in more than one portfolio. Five companies were listed by two funds, and two companies were listed by three funds. Only two cases have two portfolios with more than one firm in common. No two portfolios have three firms in common. Thus, in assessing inclusion of firms in portfolios based on social responsibility,

<sup>3</sup> Responses to the request for lists of firms for the past eight years were quite incomplete. Only one fund provided such data. For that firm the average annual retention rate over the past eight years was 73.4%, with a low of 56% and a high of 93%. Another fund provided lists for four years. The annual retention rates for the period covered, in chronological order, are 32%, 57% and 72%. Two other funds provided lists for the most recent two years. Their annual retention rates were 76% and 30%. The 30% rate is for only the commercial paper portion of a money market fund; retention rates would be expected to be rather low for such a fund. The remaining two funds provided lists for only the most recent year.



there appears to be a low degree of commonality. Again, this may be due in part to different objectives of the funds and also to variation in information sources used to ascertain social performance of companies.

In assessing exclusion of firms based on social responsibility, only one set of data was available. One fund provided a so called blacklist (i.e. a list of firms not recommended as socially responsible) in response to the questionnaire.<sup>4</sup> This one blacklist does, however, provide interesting comparisons and tentative insights into the relationships among social criteria, social information, and portfolio selection.

Table 3 presents a summary of information in the "do not advise" list. Company names are not reported, since confidentiality was guaranteed

employee health and safety, and unwillingness of a firm to provide information relevant to evaluating social performance.

A tenth factor was labeled "other." This factor was divided into four categories. The first was indirect South African involvement, e.g. a connection with a firm operating in South Africa. The second category was company product. Firms excluded under this category were, with few exceptions, involved in the manufacture of oil products, steel, chemicals, or paper. This category may be interpreted as a surrogate for environmental performance, since the majority of firms listed were engaged in recognized polluting activities. The third category was mining or mineral resource development. Firms may have been included on the list because they

TABLE 3. Factor counts for firms on "Do Not Advise" list

| Factor                                       | Total cited | Number of firms excluded on factor alone |
|----------------------------------------------|-------------|------------------------------------------|
| South Africa                                 | 255         | 179                                      |
| Other—indirect S. Africa                     | 7           | 7                                        |
| Defence                                      | 164         | 110                                      |
| Nuclear power                                | 85          | 61                                       |
| Labor relations                              | 18          | 10                                       |
| EEO                                          | 0           | 0                                        |
| Environmental pollution                      | 9           | 2                                        |
| Other—product (oil, paper, chemicals, steel) | 148         | 134                                      |
| Public safety                                | 26          | 8                                        |
| Occupational safety and health               | 4           | 0                                        |
| Willingness to disclose                      | 5           | 1                                        |
| Other—mining                                 | 34          | 32                                       |
| Other—miscellaneous                          | 4           | 3                                        |
| Nothing cited                                | 4           | 4                                        |

in obtaining this information from the fund. Ten factors or criteria were utilized by the fund in determining companies to include on the list. Nine factors were associated with specific social performance. These include: operations or investment in South Africa, defense-related contracts, involvement in the development or provision of nuclear power, poor labor relations, unfavorable activity regarding equal employment opportunity, degrading or failing to protect the environment, jeopardizing public safety, jeopardizing

were mining companies — a surrogation for a possible multitude of environmental and employee-related sins. The final category within "other", labeled miscellaneous, was minor, applying to only four firms. Miscellaneous items included such things as "percentage of foreign loans" and "tenant relations."

The column in Table 3 labeled "total cited" contains the number of times each factor was indicated as being the decisive factor for inclusion of a firm on the list. South African involvement

<sup>4</sup> The fund refers to this list as a "do not advise" list. Blacklist is the term used by the authors in the questionnaire and will be used as a more cryptic reference to the "do not advise" list. The two do not necessarily have the same connotation.

was the most frequently cited factor, with almost 41% of the firms on the list being cited for it. Defense involvement was the second most frequently indicated factor, cited for 25% of the firms. The "other — product" factor, which again may be a surrogate for environmental performance, was third in importance, being cited for 24% of the firms. Nuclear power was a rather distant fourth in importance (13%), with all other factors being of minor significance.

The top three factors listed under "total cited" were also the three most significant factors for inclusion of firms on the blacklist based on only one factor (see second column of Table 3). The vast majority of firms (85.4%) were excluded from being advisable investments on the basis of just one factor.<sup>5</sup> Almost 29% of the firms were excluded for South African involvement alone. This preponderance of single-factor exclusions does not imply that the majority of firms fall short in performance on only one social responsibility criterion, since the fund providing the "blacklist" indicated it employed a conjunctive model in evaluating social criteria. When one factor is sufficient for exclusion, the search process may cease without examining other criteria.

#### *Need for social reporting*

Research question 6 is an examination of the perceived need for social reporting by corporations. In addressing this issue, the preference for information expressed by the fund managers are discussed first, followed by managers' direct responses to the social reporting questions.

The blacklist results raise the question of whether counts reflect the frequency with which the negative criteria of the list are satisfied or simply the ease with which such identifications can be made. For example, no firm on the blacklist was cited for EEO failures. Are all of the 645 firms performing adequately on this criterion or is it impossible, because of lack of informa-

tion, for the manager of this fund to evaluate the criterion? The evidence provided by the fund manager suggests that it is availability of pertinent information on social performance not frequency of occurrence of negative criteria that is the underlying factor in excluding firms from social performance portfolios.

The manager's explicit preferences for data tend to apply to those social criteria for which blacklist citations were most infrequent. The first preference by the fund manager was for labor relations-type data, which was cited as a blacklist factor for only 2.8% of the firms. Second preference was for data on regulatory compliance and litigation involving environmental protection, occupational safety health, and public safety; combined citations for this factor totaled only 6% of the firms. Preference 3 was for the data about foreign involvements, including South Africa, a factor cited numerous times. However, the preference for this information was not simply a binary question of involvement, but rather for a "description" of the involvement. This is also true for preference 5 with respect to defense contracts. The social criteria with respect to these two factors were stated by the fund manager so as to require some assessment of the *degree* of dependence on South African or defense business.

Interpretation of preferences 3 and 5 as being a call for more and better information about foreign and defense involvement is supported by the absence of any preference for additional data about firms' involvements with nuclear power. The criterion for nuclear involvement was stated by the manager much more categorically than those for South Africa and Defense, i.e. "don't select firms that operate or provide products to nuclear power plants," an easily obtainable fact. No assessment of degree is required, since it is stated as a strictly binary proposition.

Preference 4 was for EEO data, a factor not cited for any of the excluded firms. The fact that

<sup>5</sup> Seventy-six firms (approximately 12%) were cited on two factors. Thirty-one of these were for the combination of South Africa and Defense; the next most frequent combination, 11 citations, was South Africa and Public Safety. There were only 15 firms with three factors cited, eight for the combination South Africa, Defense, and Nuclear Power. Only one firm each was cited on four, five, and six factors. No firms were cited for more than six factors.

the fund manager considered this a negative criterion even though it was never employed implies that information for such evaluations is not readily available. The preference list interpreted in conjunction with the stated social criteria tends to support the view that the frequency of factor citations in Table 3 is more a function of information available for evaluating criteria than it is a function of firms' performances with respect to the criteria.

Comparisons of the blacklisted firms with the list of firms in the other five funds' portfolios provides some insights into the efficiency with which decisions about a firm's social responsibility are made and suggests further need for consistent and comparable information available to all investors. Table 4 contains a summary of the commonalities between each of the five social

blacklisted for some criterion not listed as a criterion by the fund that included them. For example, Fund A included in its portfolio six firms which appeared on the "do not advise" list. However, Fund A did not list as one of its social criteria any of those criteria for which the firms were blacklisted. Thus, the presence of 14 of the blacklisted companies among the list of selected companies can be accounted for by a difference in definition of social performance.

In contrast, column 3 provides a count of the number of blacklisted firms included in the portfolios of the other funds for which the blacklisting criterion was listed by the selecting fund. These funds, however, did not list a data source that permitted evaluation of the criterion. Nine selections fell into this category, but it is dominated by Fund E, with all eight of the

TABLE 4. "Blacklisted" firms included on other portfolios

| Fund | Column 1<br>Blacklist<br>firms in<br>portfolio<br>Number (%) | Column 2<br>Number<br>blacklisted<br>for criterion<br>not listed | Column 3<br>Number with<br>criterion,<br>but not<br>listed<br>data source | Column 4<br>Number with<br>listed<br>criterion and<br>listed<br>data source | Column 5<br>Blacklisted<br>"other"<br>criterion<br>can't<br>categorize |
|------|--------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| A    | 6(23.1)                                                      | 6                                                                |                                                                           |                                                                             |                                                                        |
| B    | 7(30.4)                                                      |                                                                  | 1                                                                         | 5                                                                           | 1                                                                      |
| C    | 17(35.4)                                                     | 8                                                                |                                                                           | 1                                                                           | 8                                                                      |
| D    | 1 (5.3)                                                      |                                                                  |                                                                           | 1                                                                           |                                                                        |
| E    | 8(17)                                                        |                                                                  | 8                                                                         |                                                                             |                                                                        |

responsibility fund lists of included firms and the list of "do not advise" firms of the sixth fund. The proportion of membership of blacklisted firms in each of the other funds' portfolios ranges from a low of 5.3% for the fund labeled D to a high of 35.4% for fund C.

On the surface, the relatively high percentages for three of the five funds creates the impression that identification of socially responsible firms in the other portfolios may be somewhat haphazard. However, the presence of blacklisted firms in the other portfolios may be due to differences in criteria and information sources or lack of information.

Columns 2-5 of Table 4 contain the breakdowns of blacklisted firms by each of four categories. Column 2 contains the number of firms

fund's selections of blacklist companies in this category. Thus, even though this fund is guided by similar social responsibility criteria in its selection of investments as the fund providing the blacklist, the inconsistency in or lack of information may be causing selection of firms that are not necessarily "socially responsible". It is important to note here that the fund providing the blacklist also had one of the longest information sources lists; thus, it may be that funds without the resources to avail themselves of numerous sources of information may be making less knowledgeable social investing decisions.

The information in column 5 is not subject to convincing interpretation. The nine selections in this category were included in the "do not advise" list on the basis of the "other" criterion.

Five of the nine were excluded in the category "other-product"; the remaining four were excluded in the category "other-mining". Although neither Fund B or C listed any social criteria that would imply an exclusion based on type of industry or product, they did list environmental performance. Thus, only a polluting paper company, for example, would be excluded under B's or C's criteria. Given the general nature of this industry category, it is not possible to definitely explain the presence of these nine firms either by absence of criteria or information; either, both, or neither may be the cause.

The seven selections in column 4 are inconsistent investment choices based on the stated criteria of the funds. Funds selecting these firms espoused the social criteria cited for the firms' inclusion on the "do not advise" list and also listed information sources for evaluating the criteria. All seven citings were for South African involvement. However, three of the seven selections were the same firm in different funds. This firm was included on the "do not advise" list for *indirect* South African investment, an "infraction" that could go undetected, or if detected could be reasonably "forgiven." So, of the total of 39 selections of blacklisted firms by other funds, only four appear to be genuine anomalies. The remaining "misclassifications" appear to be due to differences in criteria or differences in the quantity or quality of social performance information.

Direct opinions as to corporate disclosure of social performance information were solicited in section 2 of the questionnaire. Three questions were designed to obtain fund managers' opinions on the need to require disclosure of social performance information. Responses to these questions are summarized in Table 5. Fund managers were in favor of accounting rulemakers giving high priority to social performance disclosures. Only one manager believed it should be given no priority and he/she manages the one fund which avowedly is not a strict social responsibility fund. On the question of perceptions about the actual priority given by accounting rulemakers to social performance disclo-

tures, there was little disagreement among responding managers: they believe that little priority is currently given.

Four of the five managers responding to question 3 stated that requiring disclosures would give them easier access to socially relevant data. The one "no" respondent feels he/she is already able to obtain the information needed. However, this manager did indicate that rulemakers should give high priority to social performance disclosures, since he/she doesn't believe the "public" has the same access to the information that he/she has.

Information that would be desired most by those responding "yes" to question 3 is listed at the bottom of Table 5. The most important disclosures appear to be data about equal employment opportunity and employee welfare. All managers requested some type of data pertinent to evaluating those two dimensions of performance. Product quality and environmental impact-type data were listed by two of the respondents. The remaining items listed were all specific to a particular fund manager.

## CONCLUSIONS AND SUGGESTIONS FOR ADDITIONAL RESEARCH

The results of this study suggest several tentative conclusions regarding social responsibility investing. Although the social objectives of the mutual funds differ, there appears to be a consensus on the primary characteristics of social performance desired in portfolio companies. Six performance factors: environmental protection, equal employment opportunity, treatment of employees, business relations with repressive regimes, product quality and innovation, and defense contracting, were listed as investment criteria by a majority of the fund managers. Thus, at least among the mutual funds managers surveyed, these dimensions of social performance appear to be significant in investment decision-making.

The lack of adequate social performance information was consistently cited by the managers and reflected in the wide variation in the num-

TABLE 5. Summary of responses to social information opinion questions

|                                                                            |                                                          | Number responding:                                                        |    |          |                                                   |    | No responses | Average responses |
|----------------------------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------------------------|----|----------|---------------------------------------------------|----|--------------|-------------------|
|                                                                            |                                                          | 1                                                                         | 2  | 3        | 4                                                 | 5* |              |                   |
| Question 1:                                                                | What priority should be given to disclosure?             | 1                                                                         | 0  | 2        | 1                                                 | 2  | 0            | 3.5               |
| Question 2:                                                                | What priority is given to disclosure?                    | 3                                                                         | 2  | 0        | 0                                                 | 0  | 1            | 1.4               |
| *1 = no priority, 5 = high priority                                        |                                                          |                                                                           |    |          |                                                   |    |              |                   |
|                                                                            |                                                          | Number responding:                                                        |    |          |                                                   |    |              |                   |
|                                                                            |                                                          |                                                                           |    | No       |                                                   |    |              |                   |
|                                                                            |                                                          | Yes                                                                       | No | response |                                                   |    |              |                   |
| Question 3:                                                                | If disclosure were required would you have easier access | 4                                                                         | 1  | 1        |                                                   |    |              |                   |
|                                                                            |                                                          | (a) Why a "No" response Already able to obtain necessary information      |    |          |                                                   |    |              |                   |
|                                                                            |                                                          | Respondent:                                                               |    |          |                                                   |    |              |                   |
|                                                                            |                                                          | (1)                                                                       |    |          | (2)                                               |    |              |                   |
| (b) If yes, what disclosures would be most useful, in order of importance? |                                                          | 1. EEO-I filings                                                          |    |          | 1. How company treats employees                   |    |              |                   |
|                                                                            |                                                          | 2. Pollutant outputs                                                      |    |          | 2. Minority/women employment                      |    |              |                   |
|                                                                            |                                                          | 3. Accident frequency and severity numbers                                |    |          | 3. Environmental protection                       |    |              |                   |
|                                                                            |                                                          | 4. Product recall details.                                                |    |          | 4. Product quality/safety                         |    |              |                   |
|                                                                            |                                                          | (3)                                                                       |    |          | 5. Charitable contributions                       |    |              |                   |
|                                                                            |                                                          | 1. Extent of union representative/ other collective bargaining agreements |    |          | (4)                                               |    |              |                   |
|                                                                            |                                                          | 2. Regulatory compliance & description of ongoing litigation              |    |          | 1. EEOC data                                      |    |              |                   |
|                                                                            |                                                          | 3. Description of involvement in foreign countries                        |    |          | 2. Community investment data                      |    |              |                   |
|                                                                            |                                                          | 4. EEO breakdown of employees                                             |    |          | 3. Plant closure and layoff responses information |    |              |                   |
|                                                                            |                                                          | 5. Description of military contracts                                      |    |          |                                                   |    |              |                   |

bers and kinds of information sources mentioned and in the resulting portfolio selections. The results suggest that at present much of the desired social information is both difficult to obtain and incomplete. The fact that most of the managers felt company-produced data, including annual reports, were the best sources of social information is particularly disturbing. Prior research has shown (Wiseman, 1982; Ingram & Frazier, 1980; Rockness, 1985) that annual report social information is at best not directly related to actual performance and may in fact be misleading. Therefore, the use of this voluntary information in investment decisions may be counter-productive to the objectives of the funds. The extensive citings of other information sources such as government reports, non-profit

organization reports, and private sources, suggests that these investors do in fact search for and obtain whatever corporate social performance information is available, but some of the desired information is cited as not available.

Prior arguments against social reporting have focused on the lack of agreement on what constitutes social performance, the lack of measurability of the performance, and the cost of producing the information. The results of this study, limited to the funds surveyed, suggest that there is consensus on the set of social performance dimensions on which investors focus and that much of the information investors perceive as useful in social performance decisionmaking is measurable and could be reported at relatively low cost. Much of the environmental compliance, equal

employment opportunity, and treatment of employees data that managers indicated was unavailable is presently being reported by companies to government regulatory agencies or to unions. It seems that the same information could be reported to the public at little incremental cost if such disclosures were required. Similar reasoning holds for the information about engaging in business with repressive regimes. Companies are aware of whether they are engaged in business with these types of regimes, and reporting it is a matter of disclosure requirements.

Managers of social responsibility funds believe there is a need for social reporting requirements regarding certain dimensions of corporate social performance. Additional research in the vein of this study is needed to determine whether the preferences expressed by these mutual fund managers can be generalized to larger groups of investors such as universities, foundations, and churches, or to other corporate constituencies, e.g. employees, legislators, social scientists, or "society" in general.

Results of this survey also suggest two salient issues requiring understanding if useable social reporting models are to be devised for companies and accounting rulemaking bodies to evaluate. The first of these issues deals with the

processes by which social and financial data are utilized for judging the performance of a firm. Little can be inferred from the information provided by the participants in this survey about the potential effects of information sequence on judgment consistency, or tradeoffs the managers made in combining two distinctly different evaluations in making investment choices. The second issue is one of social data reliability. Managers reported using information from many sources, with firms being the most prominent. As noted earlier, existing evidence on the use of firm-reported social data as indicators of social performance suggests reliability is low. If social data sources other than the firms are not independent, i.e. if they largely propagate data initially provided by firm managements, then the *overall* reliability of available social data may be low. Comparisons of the content of firm-reported data with that reported by other sources would provide evidence on the amount of redundancy among sources. Knowledge of the overlaps among sources and of the procedures sources used for generating uncommon data would seem to be important for the design of social reporting systems and decisions regarding the requirement of certain disclosures.

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#### APPENDIX. SOCIAL RESPONSIBILITY MUTUAL FUNDS

Calvert Social Investment Fund.  
 Dreyfus Third Century Fund.  
 New Alternatives Fund.  
 New Concepts Fund.  
 Parnassus Fund.  
 Pax World Fund.  
 Pioneer Group Funds.  
 Working Assets Money Fund.

## ACTION FORUM



## DYNAMICS OF ORGANIZATIONAL CONTROL: THE CASE OF BEROL KEMI AB\*

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### Abstract

The paper analyzes changes in organizational control related to changes in an organization's economic situation. The thesis of tightening managerial control as a typical managerial reaction to decline is illustrated by developments in a Swedish company chosen as a case example. The interpretation challenges explanations indicating objective, causative relationships between organizational economy and organizational control. Instead, the focus is placed on social mechanisms, such as the social attribution of causes and the increased need for legitimation on the part of managers. Control and production subsystems are also seen to be loosely coupled.

Organizational control is, and has been, one of the major topics for investigation in organization theory, even if definitions and approaches tend to diverge rather than converge and multiply rather than accumulate (for reviews and major contributions, see Dahl, 1957; Etzioni, 1965; Berle, 1967; Thompson, 1967; Gamson, 1968; Hickson *et al.*, 1971; Lukes, 1974; Allison, 1977; Grimes, 1978; Pfeffer & Salancik, 1978; Clegg, 1979; Golding, 1979; Mintzberg, 1979; Crozier & Friedberg, 1980; Dunbar, 1981). However, despite all the diversity available, two clear tendencies are easily traceable in most of the studies.

The first is that organizational control, and even more so managerial control, is understood as a form of influence, steering or regulation exerted by managerial levels *vis-à-vis* non-managerial levels in organizations. Until recently the organization literature has tended to implicitly assume that managers, and especially top managers, need not be controlled: they share goals with the owners (Fox, 1974) and are, usually, intrinsically motivated (Ellig, 1982). However, a growing and by now quite extensive literature, such as that which contrasts profit-maximization with growth as possible managerial motives

(Crystal, 1978; O'Toole, 1979; Williamson, 1981), indicates that it cannot be taken for granted that there is no need for control at top levels. As a result, we now recognize that organizational control as addressed to top managers should be both a crucial and an interesting topic for study.

Another tendency, probably initiated by Etzioni (1961), has concentrated on the *means* or methods of control. Such an approach can be explained, at least in part, by the highly pragmatic and management-oriented character of most studies. Their authors have been concerned with examining the effectiveness of various organizational procedures with a view to recommending them to managers. Students of financial controls are especially known for such an attitude [see for example Anthony *et al.* (1972) or Donnelly *et al.* (1978)]. The controllers, however, are not the only group whose perspective can be considered in organizational research (Zey-Ferrell, 1981), and it is now realized that the effects of organizational control are dependent on much more than mere procedures and practices.

If we assume a definition of organizational control from within a social paradigm (Hofstede,

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1980), then we can say that its purpose is always to change (or to prevent a change) in individual or group behavior. We know that various means can be employed to achieve this purpose; what we propose to stress is that these means can be addressed to different *targets* (Czarniawska-Joerges, 1987).

In our times, the most typical form of organizational control directly addresses what it wishes to change or to maintain: organizational behavior. Such *action control* may take the form of supervision, technical norms, calculative rules or bureaucratic regulations (see Edwards, 1982) and it is traditionally seen as appropriate or most adequate for contract-based employment.

The history of work organizations, be it as distant as the construction of the pyramids or as recent as labor camps, reminds us that desired actions can be, in specific situations, brought about by controlling the totality of a person, by influencing physical and/or psychological integrity. Such *total control* is not, as one might assume, safely limited to the past. On the one hand, we have examples from countries where, as in Poland, the entire economy can be suddenly submitted to the rules of martial law (Czarniawska-Joerges, 1987). On the other hand, we have much less dramatic and much more numerous examples of lay-offs, hidden unemployment, forced attrition and manipulated entry conditions (e.g. discrimination against women and emigrants), which are also cases of total control.

*Ideological control*, a form of organizational control which is orientated at the ideologies held by organizational members and through them at desired behaviors, is often believed to be located exclusively in religious and political organizations. However the more recent attention that has been devoted to symbolic and cultural elements as means of control (Lukes, 1974; Smircich & Morgan, 1982; Schein, 1985) has revealed that the role of ideological control has been underemphasized both by theoreticians and by practitioners, and that it seems to be a form of control that is of increasing significance at the present time.

The least discussed and probably the least

common form of control in organizations is a situation where the controller addresses the ecology (i.e. the immediate environment) of the object of control, because he or she is either unable or unwilling to choose a closer target, such as ideologies or behavior. Bribing is one example; another is the creation of good work conditions in order to attract new members. The Swedish computer labor market is a good example of such *ecological control*: the private sector is attracting young, highly qualified and ambitious computer specialists by offering them high salaries and attractive fringe-benefits. The companies cannot use action control and order young people to come (as in economies with planned employment) or ideological control (which schools could do, telling students which jobs are socially important or morally valued). Having access, however, to many more resources than the public sector, they can create an alternative which is more attractive than any other.

The relative rarity of ecological control can be explained on psychological grounds (controllers want to feel their power; the feeling of being in control is rewarding *per se* and it is weakest with ecological control) or on economic grounds (ecological control assumes an abundance of resources on the part of the controller and a relative freedom of choice on controllee's, conditions which are rather infrequent in economies plagued by scarcity).

It should be clear by now that the means and targets of control can be connected in a variety of ways: accessible means will limit the choice of targets, but a preference for a target may result in the production of new means. Moreover, the same means can be used to reach different targets. If we take budgeting and accounting as examples, they can be traditionally seen as means of action control. Budgets control behavior by steering it; accounts control behavior by checking on it. If, however, we accept a perspective which treats budget decisions as a symbolic performance (Olsen, 1970; Jacobsson, 1984), the budget then becomes a means of relating to ideologies, and influencing them. Only extreme optimists expect organizational action

to follow budget prescriptions; organizational realists treat budgets as a set of signals concerning values, and budgetary processes as arenas where these values and evaluations are negotiated. Budgets present a certain version of reality and a certain vision of the future; they also usually indicate ways of achieving a desirable future — and in that sense ideologies are their targets.

### CHANGES IN THE DOMINANT CONTROL MODE

All four control modes can be, and often are, present in all organizations, yet one mode usually dominates. It is possible to explain this in terms of such factors as the situation of the organization, management preferences and accessible resources. Charismatic leaders often choose ideological control, and prosperity facilitates the use of ecological control. Action control is frequently a result of a routine: standard operating procedures are an easy way to control activity.

What is interesting, though, are the circumstances under which the dominant control mode changes, and the pattern which such changes follow. One of the most visible situations of this kind is a situation of economic decline.

Theoretical and empirical studies of decline (Czarniawska & Hedberg, 1985; Czarniawska-Joerges, 1987) suggest that *an almost reflexive response of management to a decline situation is one of tightening control*. Managers are both advised to clamp down [see e.g. Fiedler's contingency theory of leadership (1967); or the cut-back literature, e.g. Levine (1979), Behn, (1980)] and are willing to do so. Their position in the organization is legitimate as long as they are in control. By tightening control, they are able to show, to both external and internal observers, first, that they are still in control (by making it more visible); secondly, that they are reacting to crisis (in ways that are legitimate for them as official controllers); and thirdly, that the crisis will soon pass (by appealing to the common belief, which is congruent with normative literature, that when in trouble, increase con-

trol). Therefore, a tightening of managerial control can be seen as a highly functional move, if not in terms of coping with decline, then at least in terms of increasing legitimation. In certain circumstances the change in control can then function as a self-fulfilling prophecy (Merton, 1948) and, indeed, bring the decline to a halt.

If, however, the definition of the underlying situation is not widely accepted and if the ever tightening control does not stop the decline, the leaders of the organization invariably will be replaced. The new leaders are usually allowed to tighten control further, with no negative consequences. The guilt is attributed to the previous management, and therefore the new team can perform what would otherwise be a risky control operation with no loss in trust. One such case is a topic of the subsequent analysis.

Before we move to the specifics of the case, however, some further clarification of what is meant by "tighter" or "looser" control is called for. Within our classification of modes of control, the closeness to the object (the controllee) may be seen as a criterion of "tightness" vs "looseness" of control. Accordingly, total control will be the tightest mode, followed by action control, then ideological control; ecological control would be the "loosest" extreme on such a continuum.

If we assume that decline occurs at a stage where ecological control is the dominating control mode in an organization (the most likely point, as resources are crucial for ecological control), then a typical reaction can be portrayed as a cycle, beginning with ecological control and ending with total control. After that, some resources must be put into the organization and the state of ecological control restored, at least temporarily — or else the organization dies.

Of course, decline can start, even if the dominant control mode is other than ecological. It is, however, most convenient to consider ecological control as a starting point for analytical purposes. More importantly, it can be said that many organizations were, in fact, beginning to use ecological control as a dominating mode (at least in relation to managers and professionals

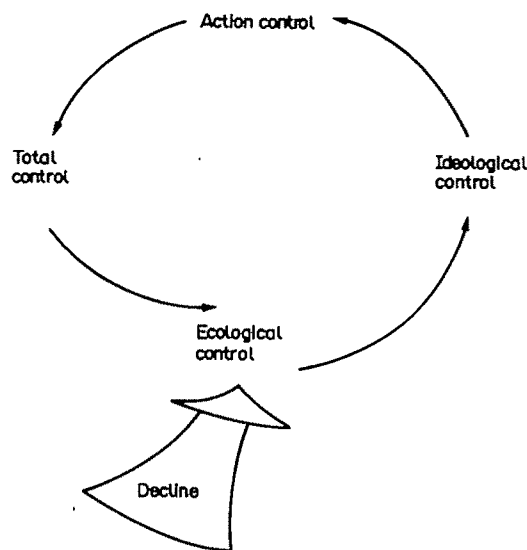


Fig. 1. Control cycle response to decline.

within the organization) at the end of the 1970s, when the oil crisis and related factors ended the long post-war period of prosperity and growth, turning the minds of businessmen and researchers alike to a forgotten topic: economic decline.

Let us move now to a case which is to be analyzed with the help of the concepts introduced above.

#### INTRODUCING BEROL KEMI AB

Berol Kemi AB is one of the leading Scandinavian companies in the field of specialty chemicals. Originally a supplier of commodity products on the basis of imported raw materials, it moved through the stage of securing its own supplies of raw materials and it is now moving towards more complete services, namely system marketing. Here is what an exquisitely illustrated promotional brochure issued by the company says of its industrial focus:

Of course we sell chemicals.

But as you have understood from this brochure, our main business is to put surface and colloid chemistry to profitable use in the industry, above all in the pulp and paper

industry, the mining and energy industry and the metal working industries.

To those industries, the chemical composition of our product matters very little. What is interesting, is the added performance in processes and products that can be achieved.

Therefore it is necessary for us to let our service follow our products. We need to sell, that is true. But to us it is just as vital to get the feedback from our customers to continually develop the products and systems that we are marketing...

We are not only close at hand when we make a sale. We are also there whenever you need us for solving new problems or for trouble shooting.

Berol's sales were approaching SKR 900 million at the end of 1983 and there were 742 employees. The headquarters is located in Stenungsund, a small town on the west coast of Sweden. There are three production plants: in Stenungsund, Mölndal and Örnköldsvik. The sales companies are located in Finland, Britain, France, Holland, West Germany, the U.S.A., Canada and Japan.

Berol Kemi AB is owned by Statsföretag, a holding company owned by the Swedish state. At present, the corporation has a double organization in its headquarters: an "operative organization", headed by the Operations Committee, and a "strategic organization", headed by the Corporate Development Committee. The recommendations of both committees meet in the Executive Management body, composed of the president, financial vice-president and three representatives of union organizations.

Berol has a matrix structure: it is composed of divisions which are responsible for product development, and regions, responsible for marketing and sales. A system of internal prices allows for the fact that both divisions and regions are profit centers. Service units also operate as profit centres.

Each profit center is subordinated to the Executive Management, but is responsible to its own Board. A member of the Executive Management sits on every Board, together with representatives of personnel and external persons. The Executive Management is responsible to the Board of Directors, chaired by the vice-president of the holding company.

Regions incorporate a number of smaller companies which are completely or partly owned by Berol. The General Managers of the Nordic, Eastern Europe and Overseas regions are situated in Stenungsund. The General Manager of the North America region, who is Swedish, resides in the U.S.A., and the General Manager of the Western Europe region, who is British, lives in England.

Figure 2 presents the organizational chart of Berol Kemi AB.

From 1976 to 1981, Berol Kemi experienced a period of a strong decline. By 1986 we are witnessing a visible recovery. The successes are not only financial, moreover. Berol Kemi AB received the 1985 Award for the Best Working Environment Company. How did it happen? What changes in control accompanied the changes in the financial situation of the company? Was control tightened, as the hypothesis suggests?

The company underwent a major structural reorganization in the period 1978–1983, and it is reasonable to suppose that the reorganization affected management processes at the top level of the company. These were therefore the focus of the study undertaken at Berol in the period from October 1981 to February 1985. An inductive approach to research was used, based on the

continuous comparative analysis of the contents of open interviews (Glaser & Strauss, 1974). The interviews aimed at reproducing the respondents' perceptions of the management process. The research was based on the view that the management process was not a composition of objectively determined characteristics but a social reality enacted by its main actors and therefore a phenomenon cognizable through an intersubjective perspective. The main source of research data was the content of interviews, conducted by the author with the top executives of Berol Kemi AB. These were complemented by an analysis of various organizational documents, including the annual reports, policy statements and confidential investigation reports.

#### A HISTORY OF BEROL

In order to analyse the dynamics of control in Berol it is important to appreciate the events which contributed to its rise, fall and recovery, accompanying this with a description of the associated changes in control, as reported in the interviews.

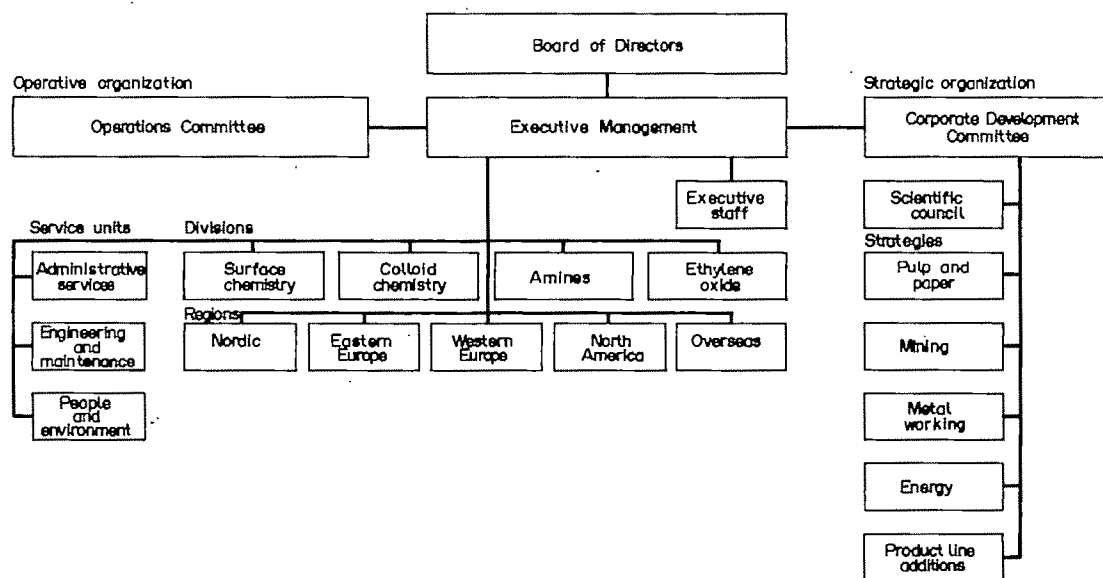


Fig. 2. Organizational chart of Berol Kemi AB.

In 1973, Statsföretag, a holding company owned by the Swedish state, became a full owner of MoDoKemi AB, which had previously belonged to Domsjö Kemiska Industrier. MoDoKemi, the company which was to become "Berol Kemi AB", was producing chemical products from imported raw materials. Its president was very interested in expanding the company and wanted it to become self sufficient by incorporating the supply side of production. The Swedish state, on the other hand, was interested both in investing in what had appeared to be an area of future profitability, and in creating additional employment in the northern part of Sweden, where such production could be located (Liljenäs & Wiberg, 1978). Hence, the interests of the president and the new owner coincided, at that time, to a high degree.

Soon after the change of ownership, several expansion projects commenced, one of them an extremely ambitious project called OXO. Investment money began to flow in, and even though OXO was consuming most of it, there was no question of competing for money: it appeared to be sufficient for everybody and every project.

On 1 October 1974, MoDoKemi changed its name to Berol Kemi. During that year, the first symptoms of an oil crisis had appeared, and the prices of chemical products changed dramatically. For Berol, it meant only that their financial results improved fantastically: heavy investment continued.

In 1975, the prices of raw materials followed product prices and Berol was forced to notice the crisis. Still, the investment involvement was too heavy for any of the parties to think seriously of retreating.

By 1976, there was no doubt about the crisis situation: it was not a question of diminished returns any longer, but of losses. The owner was becoming increasingly unhappy about the OXO project, but the project's advocates continued to present calculations proving its soundness, and a loan of 165 million SKR from Statsföretag helped to cover the losses.

Nevertheless, in 1977 the crisis was fully acknowledged. Statsföretag considered the pos-

sibility of closing down the new plants and selling or closing the whole company, or at least this was what people in Berol thought might happen. However, the possible political consequences of such a decision, combined with a hope that production, which was to start soon, would at least cover costs, contributed to a decision to continue. It was clear, though, that the calculations were largely in error and the arguments of the President and the staff supporting him were no longer accepted.

On 1 February 1978, a new President was appointed and in March he held the first meeting with Berol's executives. Several groups of consultants were then called in to restructure the company. Most of the top management were replaced by younger people, a majority of whom had worked with Berol as middle managers.

The section of the company which was working with the OXO project, called Beroxo, was legally and organizationally separated from the company on 1 January 1979, taking the expensive project along with it. Beroxo remained a supplier, however. On 1 October, another division was liquidated.

In 1980, Berol formed a sales company in the U.S.A., thus seriously entering a new market, and in the spring of 1981 a new catalyst was invented. Some divisions started to show diminished losses.

1982 brought the Social Democratic Party back to power in Sweden. The new government devalued the Swedish krona which helped Berol to cope with its remaining debts. At the same time, the corporation continued to increase its profits, the effects of which were fully seen in the 1983 results.

Figure 3 illustrates the calendar of the main events. Obviously, not all the factors have been taken into account in this short presentation. Figures 4 and 5 show, respectively, the changes in the company operations and financial results during these 10 years.

#### CHANGES IN CONTROL

The above presentation suggests that the

|                                            | 1973                                                                   | 1974                                   | 1975                        | 1976  | 1977                                              | 1978                           | 1979                               | 1980                | 1981                  | 1982               | 1983  |
|--------------------------------------------|------------------------------------------------------------------------|----------------------------------------|-----------------------------|-------|---------------------------------------------------|--------------------------------|------------------------------------|---------------------|-----------------------|--------------------|-------|
| Sales (SKR mln)                            | 246.9                                                                  | 475.9                                  | 416.1                       | 477.0 | 518.4                                             | 574.8                          | 558.0                              | 510.5               | 557.8                 | 700.3              | 862.7 |
| Production (thousand tons)                 | 132.5                                                                  | 132.8                                  | 125.5                       | 146.8 | 133.7                                             | 123.7                          | 62.8                               | 63.3                | 64.6                  | 57.3               | 59.9  |
| Income before allocation and tax (SKR mln) | 5.5                                                                    | 110.1                                  | 15.7                        | -45.6 | -182.9                                            | -62.5                          | 0.4                                | -20.1               | -46.1                 | -14.7              | 43.3  |
| Return on capital (%)                      | 8.3                                                                    | 55.4                                   | 7.6                         | -6.7  | -8.2                                              | -3.4                           | 4.9                                | 0.9                 | -5.0                  | 7.0                | 18.7  |
| No. of employees                           | 906                                                                    | 926                                    | 1113                        | 1195  | 1227                                              | 1171                           | 874                                | 850                 | 841                   | 799                | 742   |
| Calendar of events                         | 1 Jan: MODO-Kemi joins Stats-företag<br>Dramatic changes in oil prices | 1 Oct: MODO-Kemi changes name to Berol | Oil crisis has been noticed |       | Crisis in Berol acknowledged; loan of 165 mln SKR | 1 Feb: new president appointed | 1 Jan: Beroxo separates from Berol | American subsidiary | New catalyst invented | Devaluation of SKR |       |

Fig. 3. Calendar of events and main indicators of Berol's activity.

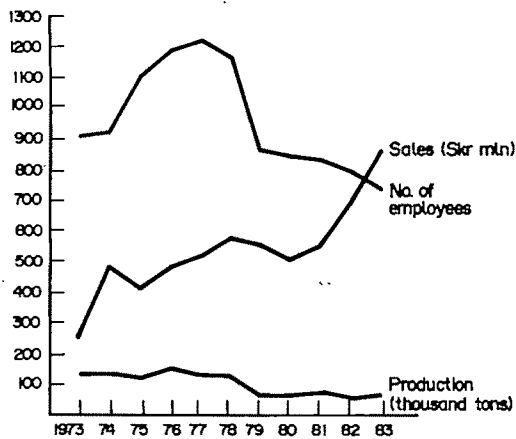


Fig. 4. General indicators of Berol's operations 1973–1983.

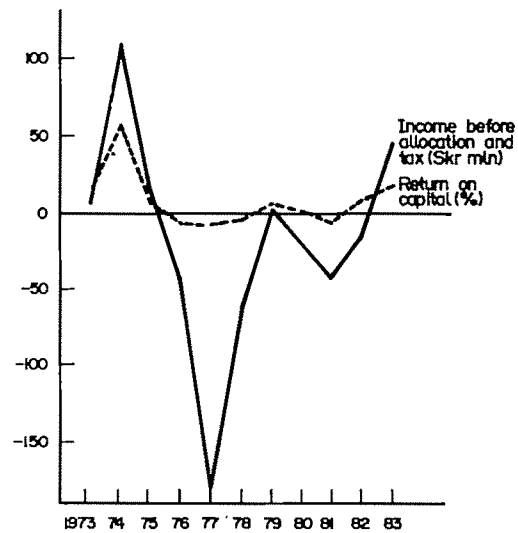


Fig. 5. Economic indicators of Berol's operations 1973–1983.

years 1973–1975 were times of ecological control. The headquarters did not interfere with the detail of managerial work. What they wanted was expansion, and in order to achieve it they provided more and more money for the company. One respondent, who at the time was a Project Manager, describes it as follows:

It was a great opportunity for me... I did not mind, at that time, that the management was crazy. I did not under-

stand that they were crazy, then. I was just given a lot of money and almost total freedom. Great job! I have had a lot of fun.

Not everybody in the company was necessarily enjoying such freedom. In fact, some of the managers introduced a very tight, action-type control inside their own units. However, such control variety was possible precisely because headquarters gave complete freedom to the unit

managers so long as they continued along the desired path of expansion. As another respondent said: "the particular units were like islands, self-governed, and contacting the mainland only when more money was needed". The lack of coordination was total, which made it very difficult to cope with a subsequent decline. The units were overspecialized, and each of them was separately controlled within the context of a pervasive form of ecological control.

It took some time before headquarters noticed the crisis. They lived in their own dream. But "one day they woke up to see the whole world changing". They did not adapt, however. A reaction in terms of "more of the same" (Starbuck *et al.*, 1978) was perceived to be the answer. Top management concentrated their efforts on external control: convincing the owner that the calculations were correct and that success was just a matter of patience and further investments.

For a long time, the holding company's response was positive, or perhaps it would be more correct to say that it was neutral. There are indications that Statsföretag did not wholly accept the OXO project, but its management philosophy and tradition had been that a subsidiary must be as autonomous as possible — Statsföretag's representatives did not perceive their role as members of the Board to be one of issuing directives.

Finally, however, the holding company's support ceased. Faced with this, the company's headquarters attempted a half-hearted attempt at total control:

I remember very clearly that there was a project to see if we could cut the personnel and it ended with one girl working half-time with the telex machine. She got cut back, which of course meant that we had no communication with the outside world, so she had to be put back again.

The situation of foreign subsidiaries was also revealing. The present Western Europe region, at that time simply a sales company, was of not much interest to the headquarters, the management of which were strongly production oriented. After a long period of striving to get

"parental" support, and in a situation of stiffening competition, an internal decision of self-imposed isolation was reached.

We decided to succeed in spite of our parent company. But if the transition had not started, this company would not exist or it would be completely different. That was quite a miracle — how long people have stayed here and been positively motivated in the face of a gloomy reality. Because one can succeed in spite of the parent company, but not during the crisis.

At the end of 1977 the atmosphere was very gloomy in all parts of the corporation:

It was a mess. Most people believed that Berol could be closed down any day. But most people thought that state ownership is a guarantee of security, so they stayed . . . . And also, we thought that the owner had just invested so much money in us that they would not dare to close us down . . . .

These hopes were, of course, not accessible to foreign subsidiaries, and apparently quite a few private decisions to quit had been reached. But they all decided to wait and see what the new leader had to offer.

Figure 6 shows the previous management non-reaction to decline in terms of our model.

The new President was appointed on 1 February 1978 and at the beginning of March he held a meeting with all executives.

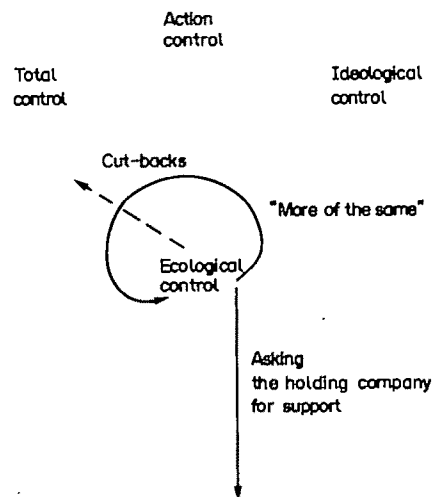


Fig. 6. Berol: 1975–1977.



He talked for two hours, and he said that we must change everything. Every mind has to be changed, and we start anew. Next week, he said, we shall have a new organizational structure and a new manager in every position.

Indeed, he moved very quickly to action control, but before we follow him, let us concentrate on the first offer: a new ideology.

Before the new President came, there was also an ideology of a sort, as we must remember that in every organization, all four modes of control are always present to a varying degree. The previous leadership was characterized (in one formulation) "by a childish fascination with new technologies", and there were several people who shared this fascination. But this is hardly an ideology to motivate salesmen who were an important part of the company, and, neither was it a particularly attractive ideology for managers. Engineers and technical people are fascinated with technologies; managers tend to treat technologies instrumentally.

The new president offered a devastating picture of the current situation: it was very bad, and:

For the first time we understood that, even if we are a state-owned company, they are not going to put up any money in order just to let us live. And I think that was very healthy.

This definition of the situation was supplemented by a vision, which was a very simple one indeed:

to be the world champions at what we are doing, and to be one of Sweden's most attractive companies.

The means and ways of achieving the desired state were more problematic, however. Even if the ideological injection resulted in gratitude, and this, in turn, in involvement and commitment, the economic situation did not allow the company to focus on ideological concerns alone. The president decided to go around the whole control cycle in order to reform every aspect of organizational life.

Action control was next in line for attention. A new structure and new rules were needed. At the second meeting with the President, the new

forms were discussed. Managers were being replaced, weakening possible resistance from the old cadre. An appropriate product portfolio was discussed, together with the principles of marketing, methods of calculating profit, internal bargaining structure, etc.

Guidelines and goals were set by the headquarters on the basis of previous communications from the divisions and regions. An overall mission was established for the whole company and a business idea for each division and each region. An interesting commitment increasing institution, a video-taped strategy seminar, required all managers to become publicly committed to their share of responsibilities.

On such a basis, objectives and targets were set. The procedure was not necessarily uniform, however. Objectives could be first communicated by the headquarters and then responded to by a unit or, alternatively, they could be proposed by a unit. Clearly targets were subject to some negotiation. In the future, however, the aim is for them to be always proposed by the managers involved.

"Strategy to the top, operations to the bottom" is now a principle that is repeated and repeated in the organization. It has a double meaning, however. On the one hand, it means that the Development Committee discusses future strategies and development projects, leaving operations to the line part of organization. But it also means that, as the managers mature, they should delegate operational responsibilities and concentrate more and more on strategies and development. That also means that an increased contribution in these matters will be expected from the units, and the formal introduction of all top managers into the work of the Development Committee was conceived as facilitating this process, even if at present managers are also welcome to present their ideas to the Committee. Some units are already well advanced in this project:

Now we are working with a plan running to 1987, on an operational level, but the division has already had its first meeting to find out what sort of guideline we could expect for 1988. . . . We are trying to be ahead of the guide-

line decision which is taken in the Development Committee. . . . We find it a very good way of working.

Planning procedures are now relatively formalized. But, as one of the managers said, "the only thing that I know for sure when I see the plan is that it is not going to be that way." Plans are not rigidly observed, even if targets are carefully examined at the end of each period.

The output control and innovation orientation are visible. As the goals are always tangible, both quantitative and qualitative measures are employed. The main goals are: profits, development of people and innovation. There is a tendency to find quantitative indicators for results, but according to the respondents, this is not a substitution of quantity for quality: quantitative measures serve as symbols of goals, making them more tangible.

The philosophy of incentives is the same as in most American companies: general managers should be well rewarded for their efforts (Czarniawska, 1985). However, marginal taxation in Sweden is a most effective obstacle to the realization of this philosophy. Salary increases and bonuses result in an increase of real income only within the lower part of the salary scale. Non-financial rewards are attempted, for example training possibilities and seminars organized in attractive places abroad, but these do not change the fact that Swedish general managers are underpaid, compared with their counterparts in other countries. Nevertheless, the questioning of the ratio between their efforts and rewards was perceived as a questioning of the Swedish system as such, which Swedish managers were unwilling to do, seeing it as basically just. However this relative acceptance of the inadequacy of rewards by the Swedish GMs contrasted with intensive protests from foreign subsidiaries who felt underpaid and said so. When openly questioned by me on how they felt about their remuneration, my Swedish respondents very often said: "I do not think in these terms." And the following comment was often repeated in the context of discussions of the incentive system:

As you have been participating in setting up those de-

velopment frameworks, or a vision, of something that you want to do, what is really important for me is to fulfil it. To do things is a big satisfaction in itself, to develop something that was not there at the beginning.

In other words, creativity, freedom and a possibility to contribute to an organizational achievement were declared as more important than financial rewards. This idealistic attitude, with strong roots in Swedish culture, explains also the initial (and the final) success of ideological control in Berol Kemi AB. But before we complete the description of the whole cycle, it is necessary to mention several original means of action control introduced when action control was the corporation's dominating mode.

#### *Separation of operations and development*

The creation of the Development Committee was meant as a device to pool creativity and not as an extension of a hierarchical structure. The body, as such, had the additional value of attracting outside people with high professional qualifications, scientists and the like. Unlike a typical solution, where such people may be members of the Board and, in this role, only very rarely have an opportunity to display their professional competence, the Committee enabled them to apply their skills directly to Berol's problems.

As for the managers, they noticed that the strategic and development aspects of their work are only separated in economic terms. Indeed that is exactly the main advantage of this organizational solution: there is no danger of short-term savings on creativity. In this sense, the double organization fulfils an important symbolic function, providing a daily reminder that the future must not be sacrificed for what seems pressing today. Thus, action control supports ideological control.

#### *Matrix structure and internal transfer prices*

There were a range of opinions, with quite substantial variation, on this important issue. Some respondents claimed that internal pricing, a very useful device in the early stages of a new organization, lost its point after the organization became familiar. Others, however, said that the

difficulty was just the reverse: the problems, if any, were due to the fact that the practice of internal pricing was entirely new, and that it had only recently begun to be used in a correct way. Still others claimed that the device only worked because it was not treated too seriously: people knew each other personally and did not get into serious conflicts. Yet another opinion expressed was that internal pricing played a very positive role in the organizational process, creating constructive conflicts, and teaching divisions to be realistic. There was a feeling that divisions, as in the past when production was the most important factor, would otherwise try to overrule regions without a check and balance introduced by the transfer pricing system. The opponents responded that managerial energy could be better spent in coping with external conflicts and not in creating internal ones.

One perspective which helps to reconcile these points of view is one which assumes that the process of internal pricing has primarily a ritualistic character. By ritual we do not mean an act without meaning, performed only as a result of tradition, but rather an act whose meaning does not lie in the direct results it produces. Internal pricing in Berol is based on a double monopoly: a region can only deal with an external supplier when a division agrees, and a division, in turn, can only introduce changes into the product with the region's consent. This double monopoly prevents a concrete rather than a symbolic use of the internal pricing arrangements, but still the device remains useful. Not only does it prevent the units from achieving internal collusion which is usually at the expense of the customer, but it also serves to channel conflicts (which may be quite concrete) and allows them to be expressed in a non-threatening way. Additionally, if Berol expands, the new units will need socialization into the company's ways of acting and internal pricing can fulfil this role. In other words, what looks like a tool from the action control repertoire (and was probably meant as such), is actually a carrier for ideology.

#### *Internal supervisory boards*

Each unit has its own Board ("styrelse"),

chaired by the president or vice-president. This is actually the main way in which Executive Management influences the divisions and regions. But the main role of this administrative structure is to bring about "participation in the middle": the participation of the shop-floor representatives in management decision-making. Instead of bringing the shop-floor representatives all the way up to the top of the company, they are brought half-way up, and, correspondingly, top management comes half-way down. This prevents the existence of an excessively large top management group in which shop-floor representatives would have to participate in decisions unrelated to their problems, therefore facing the dilemma of either acquiring a completely new competence or losing all sense of involvement. The idea of such an internal supervisory board originated from a Scandinavian consultant, Ulf af Trolle.

The action control focus dominated for almost two years and necessitated great efforts from consultants and managers alike. Even today, during the reign of ideological control, it remains the second most important mode, although one which is subordinated to ideological influences. But back in 1979 the company still had to carry heavy burdens of previous investments, so the use of total control was necessary. Beroxo was axed, and SOAB (another division) was liquidated. Statsföretag inherited the problem, as the owner of Beroxo. More changes in personnel were made, although after the organizational changes and the voluntary redundancy of top executives these mostly comprised restructurings in terms of better fit. Still, in view of the Swedish union system (and within a state-owned company), such changes are extremely sensitive, and it has been a considerable achievement to carry them through without major conflicts.

All these changes, plus a series of positive external events (a change in the business cycle, a new catalyst, devaluation, etc.) helped to restore some balance in resources. The cycle was completed, but the resources were certainly insufficient to rely on ecological control as the main mode of control. The top leaders therefore

shifted to ideological control and this remains the dominant control mode in Berol to date. It is worth adding that at some time between 1982 and 1983, Statsföretag itself accepted the main element of Berol's ideology: profitability as the basic element in the holding company's control over the corporation. The new, young managers accepted the new ideology eagerly and learned to operationalize it. As one of them said:

I do not know of any other Swedish company which has experienced such a dramatic change.

Figure 7 illustrates the cycle of control initiated by the new leadership.

It is interesting to observe that the pace of change was not the same for all divisions and regions — it was dictated by the pace of recovery in a given unit. If the company as a whole was coming under ideological control as a main mode by late 1980, some divisions were still action controlled in 1982, and under constant threat of moving to total control, i.e. closing down a unit.

There were more or less daily talks . . . They reacted by pushing very hard, applying very hard pressure to see the results, and also, by being rather active on certain points, taking part in certain activities, being more involved than you would otherwise expect.

Such emphases were seen as being functional:

Some of this advice and some of that pressure was certainly a burden for me, personally, but I think it helped. Sometimes, of course, it made us work with the wrong things, too — more paperwork than necessary, more formalities than necessary and less work on the problem itself. On the other hand, I think it also helped in pointing our noses in a better direction . . . At any rate, now I have much more freedom, I think.

However despite the perceptions of many Berol Kemi managers that changes in control caused the change in performance, such perceptions had sufficient ambiguity within them to also suggest that the connections between organizational control and organizational performance are fragile at best.

## LOOKING FOR CONCLUSIONS

The use of the control cycle response model tempts one into speculating about the causal relationships which might underlie the process or, at least, about perceptions of the causal relationships. For it seems to be clear that economic crises are in some way related to changes in internal organizational control. The most dramatic and therefore convincing examples of this were

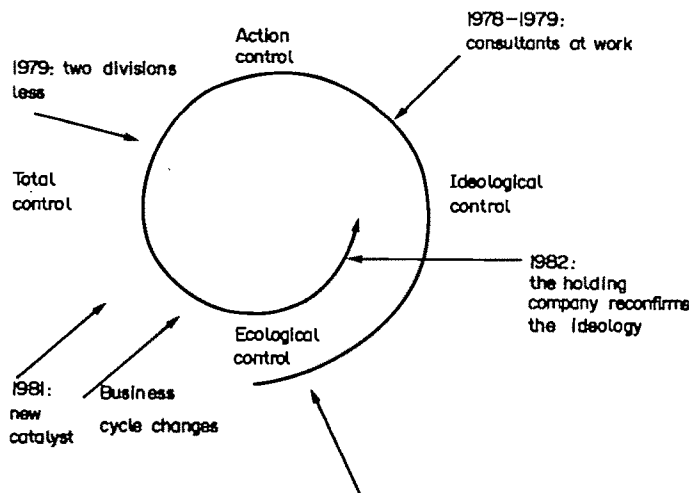


Fig. 7. Berol: 1978-1983.

seen during the Great Depression, an event which almost immediately changed all dominant control modes into one: that of total control. All manner of both individual and social catastrophes provided eloquent examples of the dramatic change in the mode of control, a phenomenon which spread to most organizations.

It is also quite clear that as leadership moves through the cycle towards tighter and tighter modes of control, that this is done in the hope of counteracting the business cycle and stopping economic decline. Let us analyse these shifts with the help of the concept of loose coupling (Weick, 1979).

Control and production can be seen as two separate subsystems in any organization. The question of which of them is of primary concern and therefore more basic for an organization's survival can be answered in many different ways, depending on the respondent's political and historical beliefs. As both subsystems can exist separately, it is perhaps safest to assume that they developed along parallel lines and then united when it became clear that they were instrumental for each other. In most cases the relationship between the two is one of a loosely coupled nature, where the subsystems have few common characteristics and interconnections. It is quite obvious that efficient and commonly accepted notions of organizational control facilitate life within organizations, contributing to members' well being and, possibly, satisfaction. However, as many years of studies on the relationships between satisfaction and performance clearly proved, there is, at the best, only a loose coupling between the two (Schwab & Cummings, 1970). But even if we assume that people who are satisfied with their jobs perform better, another loose coupling is that between individual performance and the performance of the organization as a whole. Lessons from socialist economies teach us that excellent products can be wasted due to wrong allocation and distribution decisions, and lessons from market economies show us how bad products can be skillfully used in an appropriate market niche (Burawoy & Lukacs, 1985). Allocation and other

strategic decisions also can be seen as part of control processes but, again, the coupling is very loose. Many wrong decisions produce no harm and chance plays an important role in the fate of business. If we list the factors perceived by my respondents as responsible for the company's recovery, they are as follows: the decision to stop investments, the help from the state, the new catalyzer, the change in the business cycle, the change in organizational control processes. Which are sufficient and which are necessary? The respondents emphasized also the objective importance of external factors and the subjective, psychological importance of internal factors.

This discussion should not be read as a suggestion that a rational theory of organizations should be replaced by a fatalistic one. Loose coupling contributes to the viability of the system as a whole. As Weick (1979, p. 112) has noted: "a system maintains persistent behavior in the face of variables that would normally disturb the behavior". This is possible due to the fact that in loosely coupled systems, a disturbance in one part of the system (for example, a serious conflict within a management team) reaches other parts weakened and with delay. If it were not for that, every reorganization would demolish production. Slack, resistance, gate keepers — these are all examples of loose couplings.

In the face of crisis the leadership tries to tighten the coupling between the various subsystems to strengthen the organization. But that may mean that external shocks immediately reach the whole of the organization, and that the system loses its flexibility. In his analysis of the rise and fall of the Roman Empire, Antonio (1979) applies Weberian analytical concepts and comes to the conclusion that the main cause of decline was too tight and too effective control. The Romans had perfected their control system to the extent that it choked their economy. The provinces, deprived of any autonomy, were not allowed to cope themselves with problems which arose, and the slow communication mechanisms made it impossible to ask Rome every time a problem was faced.

Tightening of the couplings between organi-

zational subsystems is therefore a risky step: it might make an organization temporarily more resistant to severe threats from outside, but from a longer time perspective such change can make the organization dangerously vulnerable. Indeed often the leadership can be the first element to be replaced when a blow hits and repairs must be done. From such a perspective, it may be observed that one of the main merits of Berol Kemi's leadership was that they moved through the tight phase of control as quickly and effectively as possible, in order to once again return to a looser mode of control. Such an awareness of the implications of different forms of organizational interdependencies helps us to appreciate that the fact that many action control solutions become ritualistic can be seen as instrumental for the achievement of the required degree of organizational decoupling.

Why then do managers insist on going through the whole control cycle? Obviously one answer is that the notion of loose coupling is not very widely disseminated among organizational practitioners (and certainly not among all organization theoreticians). Many people believe in tight couplings as both a descriptive and normative concept. Their definition of reality then becomes a causative factor, as is the case with a self-fulfilling prophecy. Another response emphasizes environmental, or societal considerations. Organizational subsystems are also coupled to the analogous subsystems in society as a whole. Markets can be seen as societal production subsystems, and politics as its control

subsystem. Although traditional economic and political theories, as espoused by many politicians and businessmen, portray couplings between societal subsystems as very loose, we would emphasize their relative tightness. In welfare states, turbulence within the economic system is immediately reflected in the political system. As a next step, horizontal couplings — between organizational and societal systems — are activated. As the wider systems can only communicate directly with their organizational counterparts, the societal control system alarms the organizational control system. Such a situation is portrayed in Fig. 8. When, for instance, the Swedish economy shows symptoms of distress, Swedish politicians tend to confer with Swedish top Chief Executive Officers on how to counteract the crisis. And what are seen as remedial steps are undertaken within the control area: a change in organizational control demonstrates the desired reactivity of the system.

In these terms, changes in control can be seen as a symbolic reaction to economic decline, both at the societal and the organizational level. A tightening of control symbolizes that the leaders have noticed the crisis and have tried to counteract it. Of course, there are other attempts to counteract economic crises which remain in the economic, or the production area. Crises thereby can be counteracted or, as some sceptical determinists prefer, they wear themselves out. So the control cycle response model does not analyse all reactions to decline. However it does serve to emphasize those reactions

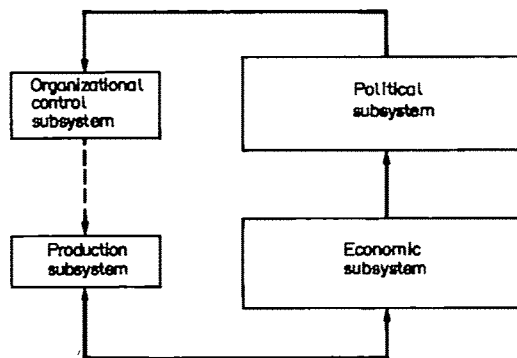


Fig. 8. Loose and tight couplings in an organization and in its environment.

which have been relatively unexplained until recently. In so doing it provides some interesting insights into processes of both control and de-

cline, focusing our attention on both persistent processes of change and ones which have an ambiguous functionality.

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## A COMPARATIVE ANALYSIS OF INFORMATION SEARCH AND EVALUATION BEHAVIOR OF PROFESSIONAL AND NON-PROFESSIONAL FINANCIAL ANALYSTS\*

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### Abstract

This study assesses the information search and evaluation behavior of professional and non-professional financial analysts. These groups were analyzed because they are demonstrably interested in financial analysis. The study compares problem-solving behavior during the analysis of an initial public offering of an equity security, using a process tracing technique. General results of the study suggest that professionals tend to treat data in different ways to non-professionals. Principal differences include strategy selection, weights attached to data and final conclusions. However, professionals also seem to use different data than that generally proposed in fundamental analysis texts.

In the *Statement of Financial Accounting Concepts 1*, the FASB states as an objective that "Financial reporting should provide information that is useful to . . . investors and creditors . . . in making rational investment, credit, and similar decisions." Given this objective, what information is useful and to whom, becomes an important issue. This paper addresses this issue in a securities valuation context using professional and non-professional financial analysts.

In general, analyses of the usefulness of data to individuals during problem-solving in particular domains have relied on assessments of how relative expertise is manifested in observed behavior. The premise of much of this research is that expert behavior is representative of desirable behavior in the domain. This orientation is important since it has highlighted the need for criteria to distinguish expert performance in a given domain from other performance. That is, if non-experts are to be trained to act like experts, or if the performance of experts is to be improved, then reliable methods for identifying performance differences must be developed

(Shanteau, 1984; Johnson, 1983).

This study addresses the accounting data and expertise issue from a broad perspective. The general premise is that members of a profession should, as a class, differentially possess certain indicators of expertise for job related tasks. Given their specialized training and the time spent on the job, it seems reasonable to expect that professionals might have, or at least develop, technical and/or other indicators of expertise which distinguishes their problem-solving behavior from that of non-professionals. Potential elements (including the type of information used) involved in such distinguishing features are examined using a process tracing methodology.

The perspective adopted views problem-solving as a process involving at least three components — information acquisition, information evaluation and feedback and learning (Einhorn & Hogarth, 1981). This study compares the behavior of professional and non-professional financial analysts during the information acquisition and evaluation phases. While professionals

\*I would like to acknowledge the financial assistance of the Accounting Research Center and the helpful comments of my colleagues at the University of Minnesota and two anonymous reviewers.



may differ from non-professionals in any, or possibly all, of these phases it is probable that what is observed in information acquisition and evaluation will have a large impact on what might be observed in feedback and learning. What is learned and somehow used is clearly related to what is observed and evaluated.

The paper proceeds as follows. First, a brief review of some of the literature pertaining to financial data analysis is presented. Hypotheses and general premises of the research are then developed. An experiment testing the developed hypotheses is then described and discussed.

#### LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Several previous studies have investigated the decision-making behavior of professional financial analysts and stockbrokers. These studies include those carried out by Slovic (1969), Pankoff & Virgil (1970), Hofstedt (1972) and Ebert & Kruse (1973). Most of these studies are principally concerned with the evaluation phase of analysis. Decisions made by subjects are generally analyzed to assess the correlations that exist among decisions and certain input variables. The general results of much of this research supported the results obtained in other areas of expert decision-making. For example, financial decision-makers, like others, seem to lack insight about which variables are most important, in a predictive sense, to their output decisions. They have the ability to use information in a configural fashion, even though their decisions can be well described using a linear combination rule (Slovic, 1969; Ebert & Kruse, 1973). Experienced subjects appear to use more quantitative information than less experienced subjects (Hofstedt, 1972). And, in an innovative study which included analyses of some aspects of information search behavior, Pankoff & Virgil (1970) found that, in a more market-oriented setting, much of the behavior observed in other settings was retained. Subjects in their study were required to purchase information in order to complete the decision prob-

lem being addressed. Prices, order and amount of information purchased, were used together with other data in the analyses of observed behavior.

However, the specific ways in which more expert analysts might differ from other analysts, or why, remained unclear. Moreover, due to the large amounts of information required for many decisions and resultant problems with co-linearity, many of the designs used were highly abstract, diminishing the generalizability of obtained results (Ebert & Kruse, 1973). This study addresses some of these issues using a more representative problem and process tracing techniques. Although this approach adds realism to the task, it is recognized that experimental control is generally reduced, as well as sample size.

Relatively few studies have been done assessing both the information acquisition and evaluation behavior of financial analysts (exceptions are Biggs, 1979, 1984; Bouwman, 1985). However, the decision behavior of professionals in other domains has been examined extensively. Physicians, auditors, managers and mathematicians, among others, have been studied in attempts to identify and explain the nature of their expertise (Biggs & Mock, 1983; Johnson *et al.*, 1981, 1982; Elstein *et al.*, 1978; Bouwman, 1980; Schoenfeld & Hermann, 1982; Howard & Morgenroth, 1968). These studies provide evidence to support the conclusion that, surprisingly, it is often difficult to reliably identify differences between groups of subjects expected to differ in performance on some dimension. However, the evidence does suggest that experienced subjects in these disciplines approach problems in ways systematically different than less experienced subjects. Their plans of attack, information assessments and general knowledge application appear to fundamentally differ from those of less experienced subjects (Johnson, 1983).

Studies directly assessing the use of accounting data or the problem-solving behavior of accountants include those of Bouwman (1980, 1983). Bouwman assessed the relative performance of students and experienced auditors in a financial analysis and diagnostic task. Subjects in

his experiment were told to find the problem, if any, that existed in presented cases of real firms that had been disguised. Bouwman found that experienced subjects appeared to use a mental checklist that guided their search and evaluation behavior. In contrast, less experienced subjects tended to simply work systematically through the data, and to accept early and relatively superficial possible explanations as *the* problem. While the experienced subjects were likely to entertain early hypotheses about potential problems, they were much less likely to accept a superficial explanation, being relatively more concerned with the root causes of the problem. Bouwman's results, that experts seem to use a checklist (know what they are looking for) and avoid early closure, were supported by Biggs & Mock (1983) and Bouwman (1985).

Biggs & Mock (1983) examined the decision strategies employed by experienced auditors during analytical review procedures. Their results involved two major findings. First, more experienced auditors tended to have late closure in solution attempts to a problem, when compared to less experienced auditors. Late closure was associated with better decisions. Second, auditors tended to use two basic strategies, which Biggs & Mock characterized as either directed or systemic. The former strategy was defined as the selection of an attribute, and a subsequent search for information relevant to that attribute alone. This strategy was associated with relatively more expert subjects. The latter, or systemic, strategy consisted of a systematic, thorough and sequential journey through the data set prior to making a decision; this strategy was associated with relatively less experienced subjects. These results imply that in general, more experienced subjects tend to be more efficient, in an effort-per-item sense, during problem solution attempts.

Biggs (1979, 1984) examined the ability of financial analysts to determine the earning power of several firms. In his 1979 study, Biggs replicated, in an accounting setting, work done

by Payne (1976) analyzing the types of decision models used by subjects during such analyses. He demonstrated that during analysis, many different models may be used, depending on the number of decisions to be made and the amount of information available. The general finding was that, as the amount of available information increased, models which implied relatively larger information loads (increased numbers of attribute comparisons), such as compensatory models, tended to be used less. Models which implied relatively lower information loads, such as noncompensatory models, were used more often. This study did not address, as a central issue, what types of information were used, or when.

Biggs (1984), however, directly addressed issues related to the information acquisition and evaluation of analysts, including the nature of strategies used during the decision process. There were three major findings of the study. First, analysts used either a future-oriented (predictive) strategy or a past-oriented (historical) strategy during analysis. Strategy selected was not significantly related (statistically) to decision output. However, the predictive strategy essentially incorporated the historical one, and appeared to require more expertise. Also, subjects using the predictive strategy had a tendency to choose different outcomes than others. Second, the behavior of the analysts with respect to information used for analysis and resultant firm rankings was very similar.<sup>1</sup> This finding was in marked contrast to results obtained by other experts (Libby & Lewis, 1982). Finally, Biggs noted that verbal protocol analysis appeared to be ideally suited for the type of analysis done in his study. A general implication of the study is that *how* information is used by the analyst is important in predicting output decision.

Bouwman (1985) summarizes and extends much of the information acquisition and evaluation literature involving financial analysts (the study also includes bank loan officers as subjects). The study investigates, using a series of

<sup>1</sup>For example, most subjects used income statement items for analysis, rather than balance sheet or statement of changes items. This may be related to the nature of the task, which required the determination of earning power.

experiments, the type and composition of financial knowledge displayed during problem-solving. In addition, Bouwman addresses the problem of establishing sufficient conditions for demonstrating expertise in financial analysis. Bouwman finds evidence to support the conclusion that financial experts, like those in other domains, appear to have superior amounts of well organized knowledge which permits them to generally out-perform less experienced subjects on tasks such as problem identification (Chi *et al.*, 1981; Schoenfeld & Hermann, 1982). They generally were able to qualitatively analyze and categorize a problem, and explain underlying relationships or principles embodied by the presented data. By comparison, novices (students) tended to concentrate on surface features and superficial relationships readily drawn from presented materials.

The protocols of the experts provided evidence to support the existence of well-defined templates which contain prototypical firm types, likely characteristics, and other standards which permit categorization and solution of encountered problems. The templates are activated by the data analyzed early in the analysis by the problem-solver. The template is a refinement of the checklist concept of Bouwman's earlier work.

In general, these studies, in conjunction with the previously cited psychological and related studies, indicate that individuals who are more experienced at some task, such as a professional, may differ from less-experienced individuals in a variety of ways. Primary indicators of these differences seem to be related to at least two major factors: first, experienced subjects may have a different amount of specialized knowledge, and, second, the storage and retrieval system associated with that knowledge may be more effectively arrayed and utilized. Not only may different amounts of information be brought to bear on a problem, but it may be done in a much more effective way. Due to their training and experience, they may be better able to identify relevant data configurations in problems addressed. Further, professionals may also be able to more accurately assess the ranges over

which individual data within an observed configuration are relevant to a potential solution to a particular problem (Johnson *et al.*, 1981). Thus, it may be reasonable to expect that professionals, engaged in a familiar task requiring specialized knowledge, ought to process the task in such a way that differences can be observed either in their ongoing processing, or the output of processing, when compared to non-professionals. This line of reasoning was tested using the following hypotheses:

- H*<sub>1</sub>. Professional subjects will use more directed search strategies than non-professional subjects.
- H*<sub>2</sub>. Professional subjects will search for and evaluate smaller amounts and fewer types of information than non-professional subjects.
- H*<sub>3</sub>. Professional subjects will use less time in search and evaluation than non-professional subjects.
- H*<sub>4</sub>. Professional subjects will manipulate and subjectively weigh information in different ways during evaluation than non-professional subjects.

## METHOD

The use of process tracing techniques typically involves a detailed analysis of the task, in addition to other method considerations. This is examined below, along with other design considerations.

### *Task and task analysis*

The task used in this experiment was the analysis of a complete prospectus of a disguised, real life firm which was in the process of going public in the equity markets. In order to make a recommendation about such a security, the analyst must determine whether the price or valuation of the security is appropriate. This usually involves the use of fundamental analysis (the use of financial and other data such as earnings per share, price-earnings ratios, etc.) in order to determine the "intrinsic value" of the stock (Reilly, 1979). Once the intrinsic value has been evaluated, and the obtained results compared to the offer price, the analyst is able to say whether the stock in question is a good buy. This procedure is particularly appropriate in the case of initial offerings of a security, since there is no

market determined price available. In fact, research reported by Reilly (1979) indicates that even after issuance, investors can earn excess profits, given the risk class, by carefully selecting appropriate securities. Thus, there is substantial incentive to accurately assess the value of newly issued, or about to be issued, securities. Subjects were also provided information for several macro-economic variables (such as the inflation rate), as well as several industry specific statistics.

### *Subjects*

Seven subjects participated in the experiment — four professionals and three non-professionals. All were required to be currently involved in the performance of investment analysis, either as part of their job or as part of their personal investment activity. Subjects were solicited by mass mailings to professional analysts and other financial organizations in the mid-Michigan area. Also, advertisements were placed in local outlets. Finally, subjects were compared to a profile developed by Lewellen *et al.* (1976) which considered the "typical" investor. All subjects generally meeting these guidelines were permitted to participate in the study.

Professional analysts and non-professional investors (as opposed to students) were chosen because both groups are demonstrably interested in financial analysis. The question addressed concerned the nature of the comparative advantage presumably held by the professionals. Do professionals possess more than time, place and certain specific procedural knowledge (related to how the existing system works) advantages over non-professionals (i.e. are professionals more than mere facilitators of transactions)? Non-professionals were chosen as the comparison group because it is not always

clear when, or if, subjects such as students are reasonable surrogates for experts in financial and related contexts (Ashton & Kramer, 1980; Abdel-Khalik, 1974). While the decision behavior of students is often similar in a general sense, specific components are often significantly and predictably different (Johnson *et al.*, 1981, 1982). The performance of the professionals is considered to be representative of appropriate behavior in the context of this study.<sup>2</sup>

The professionals were all trained as fundamental analysts. The non-professionals also had extensive business and investment experience. None of their jobs, however, involved security analysis. All had personal portfolios. All subjects had at least one business degree. All reported that they did some of their own research and analysis, and were familiar with initial offerings.

### *Experimental design*

A two-group, between-subject design was used in analyzing processing behavior. Subjects were placed in a room, alone, with an intercom and observation system. They were given the prospectus of the case firm and told to determine whether the firm was an acceptable investment vehicle (would they be willing to pay the indicated price), given that it was a new issue. They were free to use any method they wished in evaluating the firm. They were told that they had as much time as they desired to complete the problem. The only stipulation given each subject was that they must talk aloud during the solution process. Subjects' verbalizations during the solution process were recorded and later transcribed. These transcriptions were coded and analyzed using standard techniques (Newell & Simon, 1972; Waterman & Newell, 1971, 1976).<sup>3</sup> The overall analysis involved global

<sup>2</sup>The use of professional behavior as a performance standard can be contrasted with many of the studies using the Lens Model paradigm (Libby & Lewis, 1978). In most Lens Model studies, subjects' performance was assessed relative to a normative criterion such as Bayes' Rule. The general objective was not to assess the appropriateness of the behavior given the context of the problem; an assessment was made of the degree of deviation from normative behavior. This deviation, or bias, could then be corrected by education. However, the level of abstraction necessary to test relevant behavioral issues brought the generalizability of obtained results under question (Ebbesen & Kon'ecni, 1980). Also, the results of education tended to be transient. Consideration of such issues led to the decision to use more representative design features to the extent possible.

<sup>3</sup>All of the protocols were also coded by a relatively naive coder. The inter-rater reliability was 0.66, using the Kappa coefficient, which corrects for chance agreement across coders. Raw agreement exceeded 0.85 across subjects' protocols. A naive coder was used to serve as a *minimum* reliability benchmark to illustrate the ease of application of codes used.

modelling, as described by Bouwman (1985). Subjects completed a practice cryptarithmic problem under the same verbalization instructions prior to completing the primary task.

Subjects were paid \$20 for participating in the research. The experimental sessions were run over a one month period due to subjects' scheduling constraints. After completing the experimental task, subjects completed a debriefing questionnaire.

### THE PROBLEM-SOLVING PROCESS

Newell & Simon assumed that all problem-solving behavior occurred in a problem space (Newell & Simon, 1972). The problem space is primarily an internal structure — the problem-solvers' internal representation of the task. Problem-solving activity is considered to be a journey through the problem space. This journey comprises what has been termed predecisional, or information search and evaluation, activity (Payne *et al.*, 1978; Einhorn & Hogarth, 1981).

As used in this paper, information search<sup>4</sup> activity is assumed to include scanning processes (what one does when searching for anything visually). Information search concludes with a comparison and identification process.<sup>5</sup> The item searched for is labeled as either present or absent. In the case where the item is labeled present, the presumption is that it has been found to be in the problem space. Items labeled absent are those which the problem-solver thinks should be in the problem space but are not. Items which are not addressed by the problem-solver are assumed to be irrelevant.

Information evaluation activity is assumed to be preceded by information search activity. In those cases where a searched for item is present, a further comparison to some internal or external standard is made. The output of this compari-

son is then categorized in some way; i.e. some judgment is made *vis-à-vis* the item itself, or its relationship to other relevant items. As used in this paper, information must be evaluated to be considered used by a subject.

Central to both information acquisition and information evaluation is the notion that observed decision behavior can be viewed as hypothesis testing (Elstein *et al.*, 1978). As a decision-maker attempts to solve a problem, his or her belief(s) about specific or general aspects of the task can be interpreted as hypotheses. At least three types of hypotheses have been identified (Johnson *et al.*, 1981). First, the decision-maker's interpretation of the existing state or condition of the task object (case firm) can be viewed as a hypothesis (type a). Second, the decision-maker's conclusion(s) about each individual attribute of the object under study is a hypothesis about the state of the particular attribute (type b). Third are hypotheses resulting from the decision-maker's interpretation of sub-configurations in the data; for example, two or more attributes may be combined to draw a conclusion (type c). These are generally "classic" in nature and are termed global since the same configuration may appear in many tasks.

In general, type a hypotheses can be viewed as a type of "maintained" hypothesis, which tends to guide the analysis of a problem solver. Types b and c hypotheses are concerned with decisions made about specific features of the problem, or combinations of features, within a particular line of reasoning.

Hypothesis testing tends to guide (is an input to) information search and is the general output of the information evaluation process (this implies a feedback, or recursive system). Hypothesis generation is considered one of the primary indicators of expertise of professionals in a given knowledge domain (Elstein *et al.*, 1978; Johnson *et al.*, 1982). That is, the nature and tim-

<sup>4</sup>Information acquisition is a broader term than information search. Acquisition implies some type of retention process, in addition to scanning and locating.

<sup>5</sup>The use of comparative processes as fundamental components of behavior is not new. See, for example, Shugan (1980) and Just & Carpenter (1976). Most of Newell and Simon's elementary information processes are also fundamentally comparisons (1972).



ing of hypotheses generated appears to be related to the interaction between information presented and the knowledge base of the decision-maker. This interaction results in observed strategic problem-solving behavior, and is the basis for many identified differences across groups.<sup>6</sup>

An effective way of categorizing strategic hypothesis testing behavior is the lines of reasoning approach proposed by Feigenbaum (1978), and explicated by Kassirer & Gorry (1982) and Johnson *et al.* (1982). Using a medical diagnostic task, Johnson *et al.* identified five distinct lines of reasoning that may be used by a decision-maker during a problem-solving session:

(1) Single (hypothesis) confirmation. Subjects use only that case data that is expected or interpreted as consistent with a specific (hypothesis).

(2) Multiple (hypothesis) confirmation. Subjects use case data that is expected or interpreted as consistent with more than one (hypothesis). This line of reasoning is useful in establishing categories.

(3) Single (hypothesis) discrimination. Subjects use case data that is interpreted as being inconsistent with the (hypothesis), as well as expected or consistent data. The consistent data is only used to evaluate the particular (hypothesis), while the inconsistent data is used to evaluate other (hypotheses).

(4) Multiple (hypothesis) discrimination. Case data that is interpreted as consistent with two or more (hypotheses) is used, as well as data that is inconsistent with these (hypotheses). The inconsistent data is used to discriminate between or among the (hypotheses) that are supported by the consistent data.

(5) Incongruity resolution. Subjects use data to resolve incongruities between a selected (hypothesis) and presented data. This occurs because a particular instance of any hypothesized state may contain features not pre-

sent in the classical model of the state. For example, a firm that is predicted to be on the verge of bankruptcy may have very good current sales.

A given line of reasoning is the protocol-derived classification of the strategy adopted by the decision-maker as he or she moves through the problem space during a selected time interval. Particular lines of reasoning all require some initial amount of information acquisition. After some critical amount (which may be trivial or even pre-attentive) of information has been acquired, hypothesis generation activity begins and seems to guide subsequent processing behavior (Kassirer & Gorry, 1978; Elstein *et al.*, 1978). A given line of reasoning ends when another hypothesis (or set of hypotheses) is substituted for, or added to, the hypothesis(es) currently being evaluated. Behavior during a particular line of reasoning can be viewed as a series of elementary information processes (Newell & Simon, 1972; Anderson, 1984).

## RESULTS

*Hypothesis 1: professional subjects will use more directed search strategies than non-professional subjects*

Hypothesis 1 was assessed using the lines of reasoning approach detailed above. This hypothesis addresses the nature and content of the assessment behavior used by subjects during particular lines of reasoning while performing the task and, as such, it is not readily amenable to statistical analysis. For each subject, an assessment was made to determine whether or not evaluations were (1) consistent with either accepting or rejecting the proposed firm valuation, (2) effective in a broad sense, and (3) different in structure or number from those of other subjects. Lines of reasoning used in this study appear in Table 1. The evidence neither clearly supports nor rejects hypothesis 1.

<sup>6</sup>Control behavior, which can be thought of as a general knowledge driven mechanism for selecting the next item to be attended to, is thus a joint function of the decision-maker's knowledge and the goal or objective, given a specific data set. It is important to note that only the decision-maker need believe an item is important in order to search for and evaluate it.

TABLE 1. Lines of reasoning employed by subjects\*

| Subjects | Strategies |    |   |   |   |
|----------|------------|----|---|---|---|
|          | 1          | 2  | 3 | 4 | 5 |
| S1       |            |    |   | a | b |
| S2       |            |    |   | a | b |
| S3       | c          |    | a |   | b |
| S4       |            |    |   | a | b |
| S5       | c          | df | b | a | e |
| S6       | b          | a  |   |   |   |
| S7       |            | b  |   | a | c |

Professionals: S1–S4; non-professionals: S5–S7.

\*Numbers correspond to lines of reasoning in text; alphabetical order represents the temporal order of use during solution.

TABLE 2. Degree to which subjects used the same firm features during analysis

| Subjects | Subjects |      |      |      |      |      |
|----------|----------|------|------|------|------|------|
|          | S1       | S2   | S3   | S4   | S5   | S6   |
| S2       | 0.56     |      |      |      |      |      |
| S3       | 0.48     | 0.39 |      |      |      |      |
| S4       | 0.37     | 0.40 | 0.44 |      |      |      |
| S5       | 0.52     | 0.59 | 0.38 | 0.40 |      |      |
| S6       | 0.61     | 0.41 | 0.31 | 0.28 | 0.49 |      |
| S7       | 0.63     | 0.32 | 0.29 | 0.39 | 0.55 | 0.55 |

Professionals: S1–S4; non-professionals: S5–S7.

Table values are correlations among the features listed in Table 4, reflecting whether a particular feature was used by a subject.

TABLE 3. Professional and non-professional information use and data manipulation

|                                                              | Professionals | Non-professionals | p value* |
|--------------------------------------------------------------|---------------|-------------------|----------|
| Mean number of lines of reasoning used                       | 2.25          | 3.67              | 0.24     |
| Difference in type of line of reasoning used                 | 1,3,4,5       | 1–5 (all)         | 0.08     |
| Per cent of information addressed                            | 0.48          | 0.54              | 0.47     |
| Mean number of firm features used                            | 22.3          | 40.0              | 0.03     |
| Mean number of data manipulations                            | 44.0          | 72.7              | 0.16     |
| Correlation of number of features addressed with experience† | –0.66         | 0.33              | —        |
| Correlation of number of features addressed with time        | 0.33          | –0.33             | —        |
| Correlation of Table 2 entries (feature use) with experience | –0.94         | –0.33             | —        |
| Correlation of Table 2 entries with subject classification   |               |                   |          |
| Professional                                                 | 0.44          | 0.43              | 0.47     |
| Non-professional                                             | 0.43          | 0.53              | —        |
| Correlation of data manipulations with time                  | 0.33          | –0.33             | —        |
| Correlation of data manipulations with experience            | –0.66         | –1.00             | —        |

\*Mann–Whitney U.

†Kendall's Tau.

For example, subjects on average did not use a different number of lines of reasoning. The composition of those lines of reasoning, however, do appear to differ (Table 3). As can be seen, more than one line of reasoning may be used by a decision-maker, even though the number used tends to be small (Kassirer & Gorry, 1978). One point of interest is that all of the professional subjects used lines of reasoning that in-

corporated both hypothesis-consistent and hypothesis-inconsistent aspects of the firm (given the experimental instructions and context, these can be generally interpreted as positive and negative aspects of the firm, respectively). This can be contrasted with the reported behavior of experienced subjects in many earlier studies using the linear model paradigm (Slovic *et al.*, 1977). Most of those studies

suggested that subjects generally used positive data in problem solving, which would imply line of reasoning "a". The behavior observed here is more effective in that alternative courses of action are more likely to be considered if both positive and negative information is analyzed by the subject (Einhorn, 1980).

The data indicate that the overall strategies employed by the professionals were quite uniform, except for S3. Neither did these subjects exhibit early closure in problem-solving, a finding also reported by Biggs & Mock (1983) for their more expert subjects. Instead, subjects tended to acquire information about selected aspects of the firm, and then draw some conclusion near the end of their analysis. Professional subjects in fact appeared to use a checklist, consistent with Bouwman's (1980) findings in a similar context. S2, S3 and S4 all made statements such as "I usually look for . . ." Further, three of the four individuals also mentioned comparison firms (generally during the "summing up" process) with similar characteristics that they used to categorize the case firm. These results are generally consistent with a directed search strategy.

The non-professionals were much more varied in their approaches to the task. They tended to work systematically through the data, similar to the novices of Biggs & Mock (1983). Unlike the professionals, all of the non-professionals stated hypotheses about the state of the case firm early in processing, similar to subjects in the study of medical professionals by Elstein *et al.* (1976). S5 and S6, after deciding on a working hypothesis, used a confirmatory strategy in much of their subsequent behavior. Only S3 of the professionals used such a strategy, briefly, at the end of processing. Overall, S7 used strategies very similar to the professionals (he also came to the same conclusion, which S5 and S6 did not). Most subjects in both groups used line of reasoning 5 at the end of the analysis, which is compatible with a justification process.

*Hypothesis 2: professional subjects will search for and evaluate smaller amounts and fewer types of information than non-professional subjects*

The measure of information<sup>7</sup> available for evaluation used in this study was the composite total, from all subjects, of all firm features evaluated, counting each feature once. Information use by each individual was assessed relative to this composite (recall that an information feature was considered used if an overt data manipulation occurred relative to it).

Two measures were utilized to assess the amount of information used by a subject. The first measure was the percentage of information addressed — the number of features used relative to the composite, counting each feature once. The second measure used was the total number of features addressed, including repeat evaluations, and was termed information use. Repeat analyses were included because of the likely impact of a return to a feature on retention, and the likely impact of retention on the decision made by a subject. These measures were used because a prospectus tends to be quite long (39 pages in this study) and contains a tremendous amount of information.

Using the above measures, two views may be adopted relative to support for hypothesis 2. Professionals did not address a significantly lower percentage of firm features in task solution than the non-professionals (Table 3), which does not support hypothesis 2. However, the average number of features *used* was significantly lower, and was inversely related to the experience of the professionals. These latter results provide support for hypothesis 2, and imply that professionals were coming back to the items less often, relying on their initial impression of a feature for their decision.

The composition of features evaluated by professionals was not significantly different than that of the non-professionals. All subjects tended to evaluate a core of firm attributes; but, at the

<sup>7</sup>Information as used here is not intended to be the formal definition as used by information scientists. Rather, the usual definition as found in general use dictionaries is intended.

margin, items evaluated were quite varied, as can be seen by the magnitude of the intercorrelations, across subjects, of features used (Table 2; a listing of features addressed appears in Table 4). Subjects in both groups tended to be idiosyncratic in terms of the information analyzed, consistent with the popular view that security valuation is an "art" (Slovic, 1969). On average, only about 45% of the evaluated firm attributes were

the same across individuals, regardless of classification. The trend towards idiosyncratic behavior was more pronounced among the professionals, and varied inversely with experience (Table 3).

The top four firm features addressed by subjects appear in Table 4. The table includes the subject's own ranking, as well as a scaled ranking based on search and evaluation activity (Ander-

TABLE 4. Firm features addressed with ranking of top four features as identified by subjects and a scoring rule

| Features addressed      | Subjects |      |      |      |      |      |      |
|-------------------------|----------|------|------|------|------|------|------|
|                         | S1       | S2   | S3   | S4   | S5   | S6   | S7   |
|                         | S SR     | S SR | S SR | S SR | S SR | S SR | S SR |
| Income statement        |          |      |      |      |      |      |      |
| Sales                   | *        | *    | *    | *    | *    | * 1  | *    |
| Net inc. (NI)           | *        | *    | *    | *    | *    | *    | *    |
| Growth (NI)             | * 2      | * 5  | *    | 3    | 2 1  | * 3  | 1 4  |
| Volatility NI growth    | 2 1      |      |      |      |      |      |      |
| Costs                   | *        | *    |      |      | *    | *    | 1 1  |
| Margins                 | *        | *    | *    |      | *    | *    |      |
| Balance sheet           |          |      |      |      |      |      |      |
| Debt level              | *        | *    | *    |      |      | *    |      |
| Book value              | *        |      | *    |      |      |      | *    |
| Other firm features     |          |      |      |      |      |      |      |
| Backlogs                |          | *    |      |      |      |      |      |
| Return/asset            |          |      |      | *    | *    |      |      |
| Audit opinion           |          |      |      | *    | * 4  | *    | 3    |
| Product line            | *        | 1 5  | 1 1  | 4    | 1 1  | 3 2  | * 1  |
| Competition             | 3 3      | *    | * 3  | *    | *    | *    |      |
| Customer size           | *        | 2 1  | 2 3  | * 3  | *    | 3 4  |      |
| Customer type           |          | *    | *    | *    | *    | *    |      |
| Dilution                |          |      |      | *    |      |      | *    |
| Dividend                | 1 4      | *    |      |      | *    | *    |      |
| Mgmt talent             | *        |      |      |      | *    | *    | *    |
| Legal matters           |          |      |      | *    |      |      |      |
| Mgmt payroll            | *        | *    |      |      | *    | *    | *    |
| Use/proceeds            |          | *    | *    | *    | *    |      |      |
| New issue               | *        | 3 3  |      |      |      |      |      |
| Risk                    |          | *    |      |      | *    | 1    | *    |
| Sales basis             | *        |      | *    |      | *    | *    |      |
| Suppliers               | *        |      |      |      |      | *    | *    |
| Industry and other data |          |      |      |      |      |      |      |
| Industry beta           |          | 4    |      |      |      |      | *    |
| Market conditions       |          |      |      | *    |      | *    | *    |
| PE ratio                |          | *    |      | *    |      |      | *    |
| Underwriter             |          |      | *    |      |      | *    | *    |
| Investment options      |          | 4    |      |      |      |      |      |

S = subject's ranking from debriefing questionnaire; SR = ranking resulting from scoring rule.

\*Addressed by subject during processing.

son, 1984).<sup>8</sup> As can be seen, subjects varied in their beliefs concerning what was important to their decision. Like those in Biggs (1984) and Bouwman's (1985) studies, subjects relied extensively on income statement items, along with several firm specific features. Few used the balance sheet data to any significant degree (it was virtually ignored by the non-professionals). This would suggest that valuation is an earnings-based endeavour in the general case. Nonetheless, one factor of interest was that most of the professionals felt that good financial data were ultimately necessary, but not sufficient, indicators of financial viability.<sup>9</sup> The most important factors, most felt, were the product itself and the customer base. Production information was the only item considered very important by a majority of both groups. Traditionally popular items, such as earnings per share, were always used, but were not given as much weight. Only the non-professionals tended to rank earnings information among the top four choices.

Finally, the professional's choice of firm features to evaluate did not appear to depend on

whether the analysis was for personal investment purposes, or the guidance for others. Two of the professionals were told to evaluate the firm as a potential personal investment, while the other two were told to consider the firm as a vehicle for customers. There were no statistical differences between groups on any dimension — time, attributes evaluated or choice made.

*Hypothesis 3: professional subjects will use less time in search and evaluation than non-professionals*

The results were not consistent with hypothesis 3. While the average absolute difference in time used between professionals and non-professionals was relatively large, the differences were not significant<sup>10</sup> (Table 5). Further, the amount of information evaluated and the type of manipulation during evaluation (operators used; in effect, these are comparisons to either external or internal standards) were not highly correlated with time (Table 3). Regardless of the time spent, all professionals came to the same conclusion.

TABLE 5. Comparisons of time to task solution and lines spoken during solution

|                                          | Professionals | Non-professionals | <i>p</i> value* |
|------------------------------------------|---------------|-------------------|-----------------|
| Time                                     |               |                   |                 |
| Average total time (min)                 | 38            | 73                | 0.16            |
| Time per positive item (sec)             | 15            | 44                | 0.03            |
| Time per negative item (sec)             | 33            | 40                | 0.48            |
| Within group <i>p</i> value              |               |                   |                 |
| (+ – items)                              | 0.068         | 0.593             |                 |
| Correlation of time used with experience | -0.66         | 0.33              | —               |
| Lines spoken                             |               |                   |                 |
| Lines per positive item                  | 2.3           | 5.6               | 0.05            |
| Lines per negative item                  | 6.5           | 5.6               | 1.00            |
| Within group <i>p</i> value              |               |                   |                 |
| (+ – items)                              | 0.068         | 1.00              |                 |

+ Item interpreted as positive attribute; – Item interpreted as negative attribute.

\*Mann–Whitney U; †Wilcoxon test.

<sup>8</sup>Rankings from the two instruments are uncorrelated ( $p=0.48$ ; Kendall's Tau). This result is similar to that obtained in the linear model literature in that it suggests that often, decision-makers may be unaware of what is relatively more important to their output decisions. When the measure is simply one of presence in the ranking, the correlation rises to 0.25 and is significant with  $p=0.02$ . Note that this is a comparison of only the top four items, not of simple inclusion in both sets.

<sup>9</sup>The same sentiment was expressed about the auditor's report.

<sup>10</sup>The insignificant findings for both the time and operator use measures (hypothesis 4) are driven by one subject in the professional group. Without this subject, who was inexplicably quite different from the other professionals (it may be related to the fact that he was also an academic!), both differences are significant at the  $p=0.05$  level using the Mann–Whitney U-test.

*Hypothesis 4: professional subjects will manipulate and weight information differently during evaluation than non-professional subjects*

The manipulation aspect of hypothesis 4 was not supported by the data, as can be seen in Table 3. That is, professionals did not use fewer data manipulations (statistically) than the non-professionals when evaluating the data, even though professionals tended to use fewer data transformations or operators overall. This latter tendency was fairly strong and relatively independent of the time taken in task solution. The number of overt data manipulations was correlated 0.33 with time to task solution (Table 3).

However, evaluation activity did yield processing differences when other aspects of behavior were considered (Table 5). The data suggests that the professional subjects tended to subjectively "weight" characteristics perceived as negatives significantly different than positive characteristics, a finding consistent with those in the psychological literature regarding potential gains and losses (Tversky & Kahneman, 1979). More time tended to be spent analyzing such items and more tended to be said (non-professionals did not weight positive and negative characteristics differently on these measures). Assuming that such increased attention implies greater reliance in the decision-making process, this finding is at variance with results reported in many of the Lens Model studies. These studies tended to show that subjects overweighted positive aspects of cases (Slovic *et al.*, 1977). In this context, only relatively naive subjects tended to weight positive aspects of the case highly. Every subject who weighted negative items more heavily decided against the firm as an investment vehicle.<sup>11</sup>

Professionals gave indications of this differential weighting in other aspects of their behavior. Several indicated that if the majority of the stock came from selling shareholders, they wouldn't

be interested in the security, and processing would cease. This position would be adopted no matter what positive attributes the firm possessed. In no case did a professional subject state that a positive attribute was sufficient to override any negative attribute.

### *Performance*

All of the professional subjects concluded that the case firm was overpriced (one non-professional, S7, concurred). This conclusion is interesting in that two views may be taken of its correctness. The case firm's shares sold out at the offer price and actually increased in value over the subsequent post-offering quarter. It was ultimately chosen by a major business publication as a firm to watch. Subsequently, however, the firm has declined in value (below the offer price, as was predicted by the professionals). One interpretation is that the professionals may take a longer term perspective on such offerings than do non-professionals, resulting in different decisions. Nonetheless, it is not clear whether the professionals outperformed the non-professionals.

## DISCUSSION

A consistent finding in the decision-making literature is that the task is a major determinant of observed behavior (Simon & Hayes, 1976; Einhorn & Hogarth, 1981). An inference that may be drawn from this result, given the general finding that more expert subjects in areas such as medicine, physics and mathematics tend to categorize and evaluate problems in very similar ways, is that the tasks are similar (Johnson *et al.*, 1982; Chi *et al.*, 1981; Schoenfeld & Herrmann, 1982). Results obtained in this and other financial analysis studies suggest that financial tasks may differ in substantive ways from tasks in the above domains.

For example, in both Biggs<sup>12</sup> (1983) and

<sup>11</sup>This finding is not inconsistent with the Lens Model results if one assumes that the problem-solver is working under the assumption of a negative outcome. However, this assumption was not generally made in Lens Model studies. Subjects in those studies generally overlooked negative aspects of problems regardless of context.

<sup>12</sup>Though Biggs reports a high degree of similarity of information used by his subjects, it is evident from his Table 3 that he is referring to *categories*, not specific data items.

Bouwman's (1985) studies, it can be inferred that, beyond two or three primary items, individual items analyzed by subjects are fairly disparate. In contrast, both Chi *et al.* (1981) and Shoenfeld & Herrmann (1982) reported high degrees of consensus among more expert subjects' (physicists and mathematicians, respectively) choice of information to evaluate. Johnson *et al.* (1981) reported similar, though less strong, results for medical experts. While this difference may be partially mitigated by the intercorrelation of many financial statement items, it remains a significant difference between financial and other experts.

In a 1982 article, Fleishman mentions five task components which may be used as a basis for classifying tasks: goal, procedures, stimuli, responses and their relations. As mentioned above, results suggest that financial tasks may differ from other tasks on some of these dimensions.

One such difference may be the goal of financial analysis at the individual level, which often involves a binary decision (such as invest, do not invest). Additionally, the decision typically depends on the preferences of the analyst. Thus, what is evaluated, as well as the subsequent evaluation itself, may vary solely as a function of preference differences across evaluators. In contrast, in a medical or physics task, for example, the evaluator has no general direct impact on the underlying state classification rules and outcomes.

Another potential problem area is the relationship among stimuli (features) of financial tasks.<sup>13</sup> It is often unclear what is diagnostic in determining a firm value. In general, the market value of a firm is the composite of a set of market expectations. Thus, even though categories such as "growth firm", "emerging firm", or "mature firm" may be developed at the micro-level, the evaluator must be aware that his or her evaluation is conditional on the movement of the market as a whole. At the margin, all evaluations are relative.

In addition, given a particular firm, few guide-

lines exist to critically differentiate within or among micro-level categories other than age, product line, or history. The financial analyst generally is left to place a particular firm that is under review along a continuum of acceptable (or some variant) to unacceptable on some dimension(s) relevant to the decision at hand. While the medical or other analyst may be confronted with conflicting stimuli, underlying states and outcomes, in the abstract, can be well described.

Such differences in the task structure may mean that observed behavior of financial analysts may differ in particular ways from that observed in other domains. The lack of clear discriminators may mean that, in the general case, more of presented information may require review by the financial analyst. Thus, activity may be geared more to general systems review (e.g. revenues, costs, internal control, etc.; type b hypotheses). Only the nature of the review itself is determined by the analyst.

During the review, a binary goal structure would imply that the analyst works under two hypotheses (type a). Only the current belief as to the state of the object being evaluated would fluctuate during analysis. However, once the review is underway, behavior consistent with any hypothesis generation and evaluation process might be observed.

These conjectures appear to be supported by the behavior of the subjects in this study, especially the professionals. All of the subjects tended to review a broad core of information, consistent with a systems review orientation. This behavior is also similar to that reported by Bouwman (1980, 1985).

Like those in Biggs (1984) and Bouwman's (1985) studies, subjects in this study tended to concentrate on income statement items. Nonetheless, subjects also tended to select and use different information than might be expected, given fundamental valuation theory and related financial models. The underlying product was deemed the most important factor by a

<sup>13</sup>Another potential explanation is that financial tasks are relatively more ill-structured than tasks typically encountered in areas such as physics, mathematics or medicine (Simon & Hayes, 1976).

majority of subjects. While the product is an important indicator of potential demand, and thus future earnings, it seemed to be viewed as a separate dimension. This is important since much of the literature indicates that three or four factors are sufficient to describe most judgments made by subjects in any domain. A potential inference is that more attention should be paid to the type of valuation to be made, an observation which, at one level, supports the production of general purpose financial statements, given the varied constituencies of most firms. This observation is consistent with Bouwman's (1985) finding of differences in the information requirements of bank loan officers when compared to financial analysts. However, at another level, the evidence suggests that in this context, financial information is not necessarily definitive in providing a basis for firm valuation.

The strategies employed by professionals in this study were relatively similar in nature. Also, strategies selected tended to be better than those employed by non-professionals, incorporating both hypothesis-consistent and -inconsistent data. While such strategies do not guarantee better results, they do tend to be associated with fewer errors and better decisions (Einhorn, 1980). These strategies also support the conclusion that the professionals had late closure, as found by Biggs & Mock (1983). Overall, much of the structure is consistent with Bouwman's finding that subjects tend to use templates to guide behavior. Strategies used tended to be well

structured, and geared to specific, preselected items.

The evidence presented in this study suggests that professionals tend to treat information differently than non-professionals. While professionals may look at the same information and manipulate it in similar ways, the evidence suggests that they may attach different weights to datum, draw different conclusions about the ultimate classification of data and come to different conclusions. Professionals may also use substantially different strategies in searching for information, tending to take less time and using significantly less information overall. The general implication is that experience tends to focus the efforts of subjects. However, it is not clear if focusing leads to similarity of effort within a given strategy, as evidenced by the differences in features addressed in this study.

### Limitations

There are limitations to the generalizability of the results of this study. First, sample sizes are small and were not randomly selected. While work done by Newell & Simon (1972) indicates that the task is the major determinant of observed behavior, no claim is made that the obtained results are representative of all valuation behavior. Second, subjects worked on only one case; behavior may differ over a range of tasks. Finally, the requirement to verbalize may alter the processing behavior of subjects (Nisbett & Wilson, 1977; Anderson, 1985).

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## CULTURE AND CONTROL: A FIELD STUDY\*

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### Abstract

This paper reports the results of an exploratory study comparing the perceptions of management control systems (MCS) which are held by U.S. and Japanese workers. It is argued that because of the shared values and norms present in the Japanese culture and the valuation of cooperation by that culture, the bureaucratic procedures will be fewer in Japanese firms. However, it is hypothesized that the Japanese workers will be as aware of the presence of the controls as their U.S. counterparts. Thus, the less bureaucratic MCS's will be perceived to be as explicit by Japanese workers as the more bureaucratic MCS is by U.S. workers. Subject to all the caveats for exploratory research, the findings are encouraging to those who argue that culture affects control.

Since the recent writings of Ouchi (1977, 1979, 1981) came to prominence, significance has been attached to the role of culture in both the design and operation of control systems. The argument made by Ouchi is that culture under certain circumstances can provide a synergistic element to the control system and facilitate its operation. This is the notion of the "clan" (Ouchi, 1979). Taking the United States and Japan as two countries where there may be significant differences in the likelihood of clan behavior on the job, a field study was undertaken in an attempt to ascertain the significance of societal culture in the workers' and managers' *perceptions* of the nature of the control system.

The paper is divided into five sections. The first briefly discusses the nature of the terms "culture" and "control" and defines them for this research project. The second section outlines the manner in which Ouchi's view of the clan relates to the current literature on control and how it has been made operational in this study. The third section presents the hypotheses and

the fourth describes the methods used to collect the data and test the hypotheses. The fifth and final section presents and discusses the results.

### LITERATURE REVIEW

#### *Definition of a management control system<sup>1</sup>*

A management control system (MCS) is a mechanism designed to limit the decision space of individuals within an organization so as to affect their behavior. Its purpose is to coordinate the decisions which they make so as to increase the probability of achieving the organization's goals. A control system performs its function by controlling the flow of information, establishing criteria for evaluation and designing appropriate rewards and punishments. The four subsystems within the MCS which are designed to achieve these goals are the planning subsystem, the monitoring subsystem, the evaluation subsystem and the reward subsystem.

Central to this definition of the MCS is the no-

\*The authors are indebted to Professors John Grant, Anthony Hopwood, Michael Shields and S. Mark Young for many invaluable suggestions during the protracted period over which this paper has evolved.

<sup>1</sup> As one reader of this paper pointed out, the definition of control used in this paper may, itself, possess cultural biases. This raises an issue with which we will not grapple: is it the concept of control that differs between the cultures or only its manifestations?

tion that the organization's goals are achieved by coordinating the work of individuals and units throughout the organization as they carry out their appointed tasks. This definition of the MCS is a very broad one. It is concerned not only with control in the sense of an information mechanism that indicates if standards are met, but also with control as a behavior modification mechanism. In the latter sense the MCS is designed to encourage those behaviors which will increase the probability that the standards will be met and discourage those behaviors which will not do so. Thus, the MCS covers a broad range of an organization's activities and it facilitates the organization's achieving of its goals through the effective functioning of the four sub-systems.

#### *Explicit-implicit dichotomy*

An explicit MCS is defined as a control system where the bureaucratic rules and standards are formalized and clearly observable to all the concerned parties. The more explicit the system, the more available the rules are. In contrast, an implicit control system is defined as an MCS where the bureaucratic rules and standards are not clearly set out and readily knowable by both parties. In an implicit MCS the rules and standards must be inferred from one or more of the numerous stimuli to which the controllee (i.e. subordinate) must attend. In this context

explicit may be considered to be synonymous with formal and implicit with informal.

#### *Culture*

Culture is defined as a filter for perceiving the environment. In that sense, culture is a conceptual system which, when combined with personality, sets the action and decision premises for individuals within a given culture group. In this way, culture can be viewed as one of the forces guiding human decision making. It does this by setting the preconditions for human behavior. However, because analyses of MCS's usually take culture as a given, it may remain in the background when the behavior is discussed. See Fig. 1.

Culture as it is being discussed above and as it is used in this model, refers to national or societal culture. It is broader in scope than the notion of organizational culture which may be peculiar to the organization. The latter has been popularized by writers such as Peters & Waterman (1982). The notion of societal culture, which is the focus of this study, is the set of norms and values which the managers and workers *bring to* the job, rather than the norms and values which management and/or the workers *develop in* their work environment. Burawoy (1978) gives an example of this when he discusses the ability of blacks and whites to work together on the job (organizational culture), but

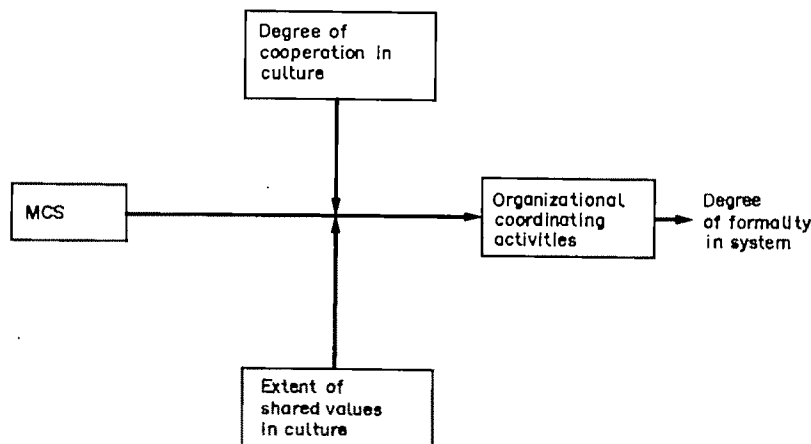


Fig. 1. Influence of culture on MCS design.

their inability to maintain the same relationship outside the work environment (societal culture). In the latter case, the values of the workers' broader culture group prevail.

The difference between organizational and societal culture is important for this study because the research issue is whether elements of the societal culture affect the design of the firm's MCS. Does the set of culture variables that are present in the society affect the design of the MCS?

A culture consists of a variety of elements. These include values, beliefs and patterns of behavior. Thus when MCSs are discussed in a cross cultural context, it adds another dimension to the analysis. Members of different culture groups may react differently to the same control mechanism or require different control mechanisms to achieve the same behavior. Thus, there is no reason to believe that a single MCS is appropriate for all culture groups.

Individuals belonging to the same culture group are similar on certain critical dimensions. However, this does not deny the fact that within a culture group there may be differences regarding *particular* norms, values, etc., which are not used to define that group. Similarly, cultural and national boundaries need not be viewed as identical. At some level, differences can be found within culture groups previously labeled "homogeneous," or a given cultural group may span national borders. Thus the idea of homogeneity is a relative one. See Snodgrass (1984). In this study, the situation where a national boundary consists of one cultural group will be referred to as homogenous and the lack of such homogeneity within a political unit as heterogenous.

The role of culture as a filter is represented in Fig. 1. The MCS and stimuli from the environment are interpreted by the individual and utilized in deciding on a course of action. Culture has two important effects on the MCS process. It can affect the choice of stimuli to which the individual attends, or it can affect any value judgments about the stimuli.

The first effect is important because it says that culture affects the database which is accu-

mulated by the cultural group's members. Certain classes of stimuli may be sought out while others are ignored because of the cultural filter. For better or for worse, the characteristics of the culture predisposes one to seek out certain classes of stimuli and to ignore others. The second effect argues that once a stimulus has been perceived, its relevance and credibility to the cultural group member also will be affected by the cultural filter. For example, the occurrence of certain courtesies may be ignored by members of one culture, but in a different culture their presence or absence may be a datum to which a great deal of significance is attached. Similar examples can be found in decision-making on economic issues. For example, see Cole (1979).

#### *Japanese culture*

Anthropologists such as Smith (1983, chapter 2) discuss the forces in the Japanese culture that stress the importance of the group and the relative unimportance of self. Significantly, Smith does not suggest that the focus on the group evolves because of a lack of concern with self. Rather, in the Japanese context a sense of the importance of harmony in relationships and ideas is paramount. Harmony in this context consists of *not making* a distinction. If a distinction between good and bad can be made, then the desired harmony is missing and something has been lost (Smith, 1983, p. 41). Aiding in the maintenance of the harmony in the Japanese society is the idea of reciprocity. This is the notion that obligations exist between parties taking part in social interactions. Each party is expected to discharge his or her obligation in a manner reflecting concern for the other. The need to maintain harmony and avoid distinctions is the obligation of each individual as he or she interacts with others.

The ideals of harmony and reciprocity are reflected in Japanese society in a variety of ways. The society reflects a notion of collective responsibility and the legal system emphasizes conciliation over litigation. Within the society there is a strong sense of (human) order and hierarchy. This leads to a strong sense of place, and one's role is heavily dependent upon one's place

in an organizational, familial or social network, rather than on one's personal attributes and characteristics.

In the Japanese workplace these forces are manifest in a variety of ways. One is consultation among group and team members under certain circumstances, such as brainstorming and quality circles. This is in direct contrast to the almost family-like sense of hierarchy present at other times. (For an interesting discussion of this through the eyes of an American employee of a Japanese firm see Irish, 1986.) Thus, harmony is maintained through the give and take of discussion and information exchange. A *team* plan or solution is developed. The potential problem of over concern with the importance of one's own view is counterbalanced by a strong sense of hierarchy. Superiors address subordinates using the titles that parents would use in a family context (Irish, 1986).

Thus the orientation which a Japanese employee brings to the job is *not* one of subjugating self totally to the group. Rather it may be characterized better as reflecting a need to develop oneself *through* the progress of the group. As Reischauer (1977, p. 152) noted:

The cooperative, relativistic Japanese is not thought of as the bland product of a social conditioning that has worn off all individualistic corners, but rather as the product of firm inner-self-control that has made him master of his . . . anti-social instincts . . . Social conformity . . . is no sign of weakness but rather the proud, tempered product of inner strength." (Emphasis added.)

The Japanese worker comes to the job prepared to consider the implications of his actions for the welfare of other members of the organization. Similarly, the Japanese manager comes to

his position already having learned the need for group consensus. Finally, the society stresses the role of subtle actions and activities and the nuances of language as a means of conveying meaning.

## THE MODEL

The concepts of culture and control come together in the activities within the organization. When the decision-makers bring different culturally-based predispositions to the job, the same stimulus may cause two decision-makers to behave differently. Conversely, two different stimuli may be required to achieve the same behavior from each. Thus the culture must be viewed as one of the factors affecting the form that MCSs subsystems take as they attempt to affect the controllee's behavior. Ouchi (1979) in describing the role of the clan in his "theory Z" model of control in organizations highlights two critical elements of the clan. First, the clan is a group of persons with shared values.<sup>2</sup> In the terms of the previous discussion, they are homogeneous on those dimensions with which Ouchi is concerned in his paper. Second, Ouchi focused on those clans whose norms or values are cooperative in their nature.<sup>3</sup> It should be readily apparent that groups exist which meet Ouchi's definition of a clan but hold an amoral view of proper behavior toward both outsiders and clan members. Such a culture would result in behavior and control systems that are the antithesis of those discussed by Ouchi and by Becker & Green (1962).

Drawing on these two important dimensions of Ouchi's model, culture and the presence of a

<sup>2</sup> Much earlier than Ouchi, Becker & Green (1962) stressed the role of group cohesiveness as a two edged sword. The cohesive work group could develop shared values which work *against* the organization's welfare and favor their own. For examples, see Roy (1952) and Burawoy (1979).

<sup>3</sup> The notion that a work group would function with a regard for the effects of the actions of one individual on others, specifically, members of the work group, is not the traditional economic analysis. However, Marschak & Radner (1972) did attempt to examine such a situation in their discussion of the theory of teams. Their teams exhibit cooperative behavior because of similarity of purpose, information, etc. Thus the idea is similar to the discussion here. However, there are some significant differences.

norm of cooperation, it would appear that organizations could exist in one of four states. One of these states possesses both a common culture and values cooperation, thereby meeting Ouchi's definition of a clan. The other three would be deficient relative to Ouchi's definition for they would not possess one or both of the critical properties found in Ouchi's description of a clan. Figure 2 shows the four conditions in a simplified form. The two dimensions, culture and cooperation, clearly are more akin to continua than being dichotomous. However, as will become more apparent later, for the purposes of

this study the assumption that they are dichotomous is acceptable.

### Cooperation

Before continuing with a discussion of the model, it is important to define cooperation as it is being used in this context. Cooperation refers to the group or cultural norm that causes the individual to be concerned about the effects his or her actions have on the welfare of others. From the perspective of economic analysis and utility theory, cooperation could be described as the presence of positive utility to individual A from

(a)

|         |               | Value placed on cooperation |     |
|---------|---------------|-----------------------------|-----|
|         |               | High                        | Low |
| Culture | Homogeneous   | 1                           | 2   |
|         | Heterogeneous | 3                           | 4   |

(b)

|         |               | Value placed on cooperation  |                                                   |
|---------|---------------|------------------------------|---------------------------------------------------|
|         |               | High                         | Low                                               |
| Culture | Homogeneous   | 1. Coordination              | 1. Coordination<br>2. Avoid shirking              |
|         | Heterogeneous | 1. Coordinate<br>2. Motivate | 1. Coordinate<br>2. Motivate<br>3. Avoid shirking |

Fig. 2. a. The culture-cooperation grid. b. Role of the MCS under differing culture-cooperation mixes.

a desirable consequence accruing to individual *B* as the result of his or her (i.e. *A*'s) actions. In such a formulation it could be argued that the utility to *A* of an act is dependent not only on the intrinsic and extrinsic satisfactions accruing to *A* from the act, but also on some other class of satisfaction accruing to *A* that reflects the accruing (or presumed accruing) of satisfaction to another party, *B*, from that act.<sup>4</sup>

An individual with a dependent utility function would be expected to behave differently to a person whose utility function is of the more conventional, independent form, for it does *not* include any such argument. This is because, holding the individual constant so as to avoid problems of interpersonal comparisons of utility, each alternative will have a different utility value with and without the other party's utility considered. Thus, the person is choosing from a different set of utility values. Unless the utility to others is so small as to be swamped by the other values, or the utilities of the other parties behave exactly as the individual's does, or the other party's utility adds a constant amount to the person's utility, the relative ranking of the various alternatives should be altered.

#### *Degree of formality in the MCS across cells*

Based on the above discussion, compare the argument for cell 1 with the argument usually offered to support the design of MCS's in cells 2, 3 and 4. In those cells, control systems founder on the failure of individuals to include the benefits to others and/or the organization in their choice of actions, when there is no *economic* incentive for them to do so. A variety of alternative techniques such as participation, bureaucratic rules and firm-wide incentive schemes have been suggested to facilitate goal congruence. Their objective is to enhance the organization's

performance by removing the impediment of conflicting individual goals (Birnberg & Sadhu, 1986). In contrast, in an environment such as the one we have labeled "cooperative", explicit and precise performance indicators for the purpose of guiding and affecting actions are not as necessary. The individual already has in mind the "bigger picture."

Thus, the first reason for expecting to find fewer formal controls in place in a cell 1 situation than in cells 2, 3 and 4 is that the presence of the dependent utility functions minimizes problems stemming from the lack of goal congruence. The problem is shifted from controlling activities to communicating the data to the proper persons so that they can make the best decision.

There is a second reason why cell 1 in Fig. 2 (the homogeneous, values cooperation cell) should have less need for an explicit and more formal control system. The presence of a homogeneous culture should mean that the workers possess a common set of values. *If these values are consistent with the organization's goals*, there should be a greater degree of goal congruence and the need for formal controls is further reduced. This is because the controls, in part, were intended to communicate and reward certain modes and standards of behavior. In a cell 1 society this is accomplished through common norms and values which are already known. Control systems using participation usually exist explicitly for the purpose of achieving goal congruence (Becker & Green, 1962). It would appear that what managers are striving to achieve through participation is a cell 1-like state.

Any formal test of the role of the MCS across cultures could be done best by comparing situations where cells 1 and 4 are assumed to exist. Ouchi (1981) and others have offered Japan as

<sup>4</sup> At the TIMS/ORSA meeting in November 1985, where this paper was presented, the authors became aware of a paper on joint decision-making in a family which proposed a similar view of a utility function. This paper, Steckel & Gupta (1985), called this utility function a *dependent* utility function.

While it is tempting to suggest that *A*'s utility is a function of *B*'s utility in utilities, this is not necessary and could lead to questions of interpersonal comparisons of utility. This, in turn, raises unnecessary questions over whether our utility measure is a cardinal measure or not. Since this is unimportant to the discussion at hand, it will be omitted. However, see Steckel & Gupta (1985).



an example of what could be called a cell 1 society. Thus, Japanese firms would appear to represent excellent examples of our cell 1 situation.

In contrast, firms in the U.S. operate in a totally different culture. They draw their workers and managers from a diverse cultural pool. One of the strengths of the U.S., we are told, is the diversity of our cultural heritages. The notion of a melting pot, even when considered in its most extreme interpretation, stresses the ongoing change. It does not describe a completed process. Thus, organizations operating in the U.S. employ a work force that possesses a diverse cultural background, i.e. cells 3 and 4. In general, most observers would argue that the members of this same work force are more likely to view their actions from the perspective of how it affects them or a small peer group rather than the organization as a whole. For examples, see Roy (1952) or Burawoy (1979).<sup>5</sup> As a whole it is reasonable to assume that U.S. firms lie primarily in cell 4 of Fig. 2.

### HYPOTHESES

Given the earlier assertion based on the work of others that the common culture found in Japan ought to yield a common set of values, the existence of that common set of values is the first hypothesis tested. The argument offered earlier was that the common culture ought to lead to shared values by workers and managers in those areas germane to organizational control. This is a two stage process. First, the similarity of values between workers and managers in each country must be ascertained. Then the patterns of shared or conflicting values which are revealed in the data can be examined.

The cultural values used in this study are assumed to evolve around the five central questions raised by Strodbeck & Kluchhohn (1961). These are:

(1) What is the innate character of humans?

- (2) What is the relation of humans to nature?
- (3) What is the temporal focus of human life?
- (4) What is the modality of human activity?
- (5) What is the relation of one human to another?

Earlier, a control system was defined as consisting of four subsystems. These are the planning subsystem, the monitoring subsystem, the evaluation subsystem and the reward subsystem. The focus of this study is on the effect of culture on the evaluation facet of the MCS. Thus, only the final three subsystems are of interest. In the subsequent hypotheses the planning subsystem will be omitted from consideration.

Given the earlier discussion, it is expected that the Japanese workers and managers would not only share common cultural values, but also have shared values relating to those three subsystems of the MCS. Because Japan is viewed as an example of a nation where a homogeneous culture exists, the hypotheses state that no significant differences are expected to be found between Japanese workers and managers.

Since there is no basis on which to assess whether the workers and managers have the "proper" amount of the shared values, this hypothesis must be a comparative one. H(1a) therefore consists of 15 experimental subhypotheses of the form:

*H1a1. Japanese workers and managers share the same values on the innate characteristic in their orientation to the monitoring system.*

Each of the subhypotheses will be of the above form. Each of the five cultural characteristics (the first phrase in italics) will be matched with each of the control subsystems (the second phrase in italics).

*H1b1. U.S. workers and managers do not share the same values on the innate characteristic in their orientation to the monitoring system.*

A second set of 15 hypotheses will be tested

<sup>5</sup> There are the exceptions. Those are the firms which have succeeded in developing an *organizational* culture that fosters cooperation. These appear to be the firms discussed by writers such as Ouchi (1981) and Peters & Waterman (1982). However, the creation of the organizational culture is part of the MCS and is hardly permanent.

(H1b) for the U.S. workers and managers. However, in the case of workers and managers in the U.S., it is expected that the null hypotheses will be rejected in most cases.

The second hypothesis is related to the definition of a control system. It stresses the MCSs intended purpose of facilitating the achievement of organizational goals and the role of culture in creating goal congruence. It would follow from the earlier discussion that an organization operating in an environment where its workers and managers enter the firm with a clear understanding of these goals and the cultural ethic to cooperate ought to have less need for a formal control system. As a result, the use of explicit rules (administrative controls) and incentive schemes should be less necessary. Moreover, many elements of the goal set may not need to be formally articulated at all. The individual comes to the organization preconditioned along (at least some of) the proper lines of thought. If this is true, it should affect the design of the control system. Specifically, it should reduce the need for complex systems of bureaucratic rules. This would permit a reduction in the scope of the formal control system. Thus the Japanese firms should exhibit less explicitness in their control systems than U.S. firms do. Instead Japanese firms should rely on implicit forms of control. Thus:

*H2a.* The formal MCS in Japanese firms will rely on implicit control techniques.

*H2b.* The formal MCS in United States firms will rely on explicit control techniques.

However, if the earlier characterization of controls as devices intended to communicate to the workers what is expected of them is correct, it does not logically follow that the Japanese workers will *perceive* their control systems to be more implicit in nature and U.S. workers *perceive* their control systems to be more explicit. Proponents of culture as a significant factor in the control system might even argue that in some instances Japanese workers would perceive their control system to be *more* explicit. The rationale for this position is two-fold. First,

to the Japanese workers and managers the cultural rules are well known. Thus the rules are perceived to be explicit — though outside the formal control system. It is when the culture fails to provide adequate implicit controls that management must institute explicit controls (see Fig. 2). Thus the *degree of formality* present in a system is not the same as the *degree of perceived explicitness*. It is the formality of the MCS which is investigated in hypothesis 2, while it is the perceived aspect of explicitness which is relevant for hypothesis 3.

To make this argument testable, the workers' and managers' perceptions of the explicitness of the various aspects of the control system will be examined. The literature (see Hage & Aiken, 1967; Hall, 1962) has described four pertinent dimensions for each of the three subsystems listed earlier. (See hypothesis 1.) These are:

- (1) Role definition
- (2) Information dissemination
- (3) Performance recording
- (4) Rule observation.

Thus 12 subhypotheses can be generated under hypothesis 3. Since there are no absolute measures of explicitness, the hypotheses are formulated in a comparative fashion. They are of the general form:

*H3.* There is (is not) a significant difference between U.S. and Japanese workers' perceptions of the amount of *role definition* in the *monitoring system*.

Each of the four characteristics (the first italic phrase in H3) will be associated with each of the subsystems (the second italic phrase in H3). Whether a significant difference is or is not expected will vary from subhypothesis to subhypothesis. The reasons are discussed below.

In the case of role definition it is expected that the U.S. workers will find the system more explicit. The contrast between the Japanese culture and the U.S. culture, perhaps, is greatest in this area. Thus for the role definition subhypotheses in hypothesis 3, the argument is that the U.S. workers will find their systems more explicit than the Japanese workers perceive theirs to be. See Smith (1984) for a general discussion and

Kono (1984, pp. 8–9) for anecdotal evidence of this.

Conversely, the Japanese culture places a great deal of emphasis on formal communication (Smith, 1983). Thus it would appear reasonable to expect that this would affect the elements of the MCS to which they are sensitive. Therefore in hypothesis 3 all the subhypotheses for information dissemination argue that the Japanese workers will perceive as more explicit the dissemination of information than their United States counterparts.

In the case of the performance recording dimension, it can be argued that the results will be mixed. Given that the U.S. firms have more explicit systems and that one of the important characteristics of an explicit system is the need to monitor performance, the U.S. workers should perceive that the *monitoring* subsystem is more explicit. However, authors discussing the Japanese culture in the workplace stress the ongoing nature of the evaluation process and the stress laid on the need to improve one's self and correct one's errors (Irish, 1986). Thus the environment within the workplace stresses correction and improvement over compliments in an almost theory X-like manner. As the result of this environment, Japanese workers should be more sensitive to the *evaluation* subsystem of the performance recording dimension and perceive it as more explicit. Finally, in the case of the reward subsystem, much has been made of the Japanese use of seniority to reward workers. *Reward* systems of this type are quite explicit.

In the case of the rule monitoring dimension it is not apparent what differences, if any, may be found. Thus there are no formal hypotheses for this dimension.

In summary, then, the subhypotheses for hypothesis 3 are:

*H3.1.* The U.S. workers will perceive that the *role definition* dimension of the MCS is more explicit for all subsystems than the Japanese workers.

*H3.2.* The Japanese workers will perceive that the *communication* dimension of the MCS is more explicit for all subsystems than the U.S. workers.

*H3.3.1.* The U.S. workers will perceive the *performance recording* dimension of the *monitoring* subsystem to be

more explicit than the Japanese workers.

*H3.3.2.* The Japanese workers will perceive the *performance recording* dimension of the *evaluation and reward* subsystems to be more explicit than U.S. workers.

## METHOD

### *Questionnaire design*

The questionnaire was designed to gather information on the various facets of culture and control discussed earlier. It went through a series of pretests to assure both its appropriateness for the issues of interest and its understandability. Particular concern was shown for the problems of communicating the instrument to the Japanese respondents. The instrument first was written in English and then translated into Japanese by a translator familiar with both the language and the research area. A back translation into English from Japanese was performed by a Japanese manager before the instrument was used. Comparison of the original English version and the back translation revealed no significant differences. A copy of the English version of the instrument is included as Appendix A. For a more detailed discussion see Snodgrass (1984).

### *Sample firms*

Data to test the hypotheses were gathered from a total of 22 large manufacturing and construction firms in the U.S. and Japan. A convenience sample of 11 firms was selected from each country. Initially, the 11 Japanese firms were selected with the help of various contacts in Japan. The firms which ultimately participated constituted a cross section of Japanese industry. Subsequently, a sample of 11 firms was selected in the U.S. Firms contacted were matched with the Japanese on industry and size. Because of limitations on access in the U.S., the matching of the samples only can be said to be approximate. However, there is no apparent reason to believe that they are unrepresentative. The matching is less of a problem than it might have been because the worker and manager responses were compared between populations rather than on a firm pair basis.

### *Sample workers and managers*

A sample of 1051 respondents was provided by the firms. Figure 3 shows the breakdown by manager/worker and by country.

### *Data collection — MCS*

A researcher visited each of the firms prior to the distribution of the questionnaires. This visit not only facilitated the distribution of the instruments, but also provided the opportunity to ascertain the nature of the firm's control system. In addition to general information, detailed information was gathered concerning the existence and scope of a set of MCS characteristics which would assist in the assessment of the explicit/implicit nature of the MCS. These were the existence and scope of: (a) job descriptions, (b) evaluation criteria and (c) organization chart and information flows.

The results of these interviews were used to formulate an overall assessment of the extent to which each of the 22 firms appeared to rely on implicit and explicit methods for control. These data were used to test hypothesis 2.

## RESULTS AND DISCUSSION

Table 1 shows the results of the 30 *t*-tests performed intra-country. As can be seen from the table, the Japanese workers and managers exhi-

bited shared values in 12 of the 15 instances using a 1% level as a test of significance. In contrast, the data on the U.S. workers and managers indicated that they possessed shared values seven of the fifteen times. While there is no basis for asserting that this means that there is or is not a commonality of culture in Japan, the U.S., or both, the patterns are perhaps more interesting than the relative percentages indicating no differences (75% for Japan and 47% for the U.S.).

The use of the traditional approach of a 1% or 5% level may be too advantageous to the research hypothesis. Given that our interest is in *not* rejecting the null hypothesis, a second approach to the analysis of the data in Table 1 may be more appropriate. Such an approach would examine the number of situations where the probability that the two groups *are* from the same population is approximately 0.5 or greater. Such a view shifts the greater portion of the burden to the research hypothesis. This is as it should be. Using this rule, there are eight cells where the Japanese workers—managers are similar and only three in the case of the U.S. workers—managers.

In the case of workers and managers in the U.S., they hold different cultural values on four of the five cultural dimensions for the evaluation system subsystem. This is consistent with the preponderance of the managerial literature in the U.S. which focuses on the problem of

|          | Country   |           |
|----------|-----------|-----------|
|          | Japan     | U.S.      |
| Managers | $n = 278$ | $n = 251$ |
| Workers  | $n = 272$ | $n = 250$ |
| Total    | $n = 550$ | $n = 501$ |

Fig. 3. Size of respondent groups.

TABLE 1. Probability that the workers and managers within a culture group share values

| Cultural characteristics     | Monitoring subsystem |         | Evaluation subsystem |        | Reward subsystem |         | Composite of three systems |         |
|------------------------------|----------------------|---------|----------------------|--------|------------------|---------|----------------------------|---------|
| 1. Man's innate character    | JM/W*                | = 0.85† | JM/W                 | = 0.47 | JM/W§            | = 0.00  | JM/W§                      | = 0.00  |
|                              | USM/W†§              | = 0.00  | USM/W§               | = 0.00 | USM/W§           | = 0.00  | USM/W§                     | = 0.00  |
| 2. Man-nature relationship   | JM/W                 | = 0.83  | JM/W                 | = 0.02 | JM/W             | = 0.68  | JM/W                       | = 0.15  |
|                              | USM/W                | = 0.869 | USM/W§               | = 0.00 | USM/W            | = 0.16  | USM/W                      | = 0.04  |
| 3. Temporal focus of life    | JM/W                 | = 0.55  | JM/W                 | = 0.16 | JM/W§            | = 0.00  | JM/W                       | = 0.02  |
|                              | USM/W                | = 0.26  | USM/W                | = 0.78 | USM/W            | = 0.52  | USM/W                      | = 0.20  |
| 4. Modality of activity      | JM/W                 | = 0.02  | JM/W                 | = 0.24 | JM/W§            | = 0.00  | JM/W§                      | = 0.01  |
|                              | USM/W                | = 0.890 | USM/W§               | = 0.00 | USM/W§           | = 0.01  | USM/W§                     | = 0.00  |
| 5. Man-man relationship      | JM/W                 | = 0.06  | JM/W                 | = 0.90 | JM/W             | = 0.74  | JM/W                       | = 0.247 |
|                              | USM/W§               | = 0.01  | USM/W§               | = 0.00 | USM/W            | = 0.26  | USM/W§                     | = 0.01  |
| Composite of five characters | JM/W                 | = 0.93  | JM/W                 | = 0.13 | JM/W§            | = 0.01  |                            |         |
|                              | USM/W§               | = 0.01  | USM/W§               | = 0.00 | USM/W            | = 0.384 |                            |         |

\* JM/W = Japanese managers compared to Japanese workers.

† USM/W = U.S. managers compared to U.S. workers.

‡ Values are the probability that the managers and workers are from the same population on a given characteristic  $\chi$  subsystem test.

§  $p \leq 0.01$ .

evaluating performance. See Birnberg *et al.* (1983).

In contrast, all of the conflicts between Japanese workers and managers occurred over the reward function. This raises several interesting issues. First, there has been concern that the younger Japanese workers are more restless and less accepting of the traditional values than the older workers were. See Snodgrass & Grant (1985). If this is true, there are two reasons why the reward system is the most obvious place in the MCS against which to rebel. First, it may be the least ingrained of the values in the culture related to the control system. Kono (1984) argued that the older workers are more accepting of the traditional seniority-based reward system than the younger workers are. Second, regardless of its merit, the managers probably have the most to gain from the seniority system.

It would be of interest to study in greater detail exactly where the disparity in values lies. Such a study might yield insights into its causes. For example, the younger workers may be responding to Japan's newly acquired status as a major economic power and may be interested in

obtaining "their share" of this newly obtained wealth. In contrast, older managers may have lower expectations based on a very different set of earlier experiences.

Table 1 indicates that the areas of the greatest agreement between Japanese workers and managers involve man and man's relationship to elements of his environment. These aspects of the culture may be particularly important in a control system given our earlier discussion of the basis for our classifying the Japanese culture as cooperative.

The second hypothesis argued that the control systems in the U.S. firms would be explicit and those in the Japanese firms would be implicit. As noted earlier, the data to test this hypothesis were based upon one of the researchers visiting each of the 22 companies and investigating the nature of their control system. The final columns in Tables 2 and 3 indicate the researcher's overall assessment.

In addition to an overall assessment, data were collected regarding three important characteristics of a formalized control system. The tables indicate the presence or absence of: (a) job de-

TABLE 2. Summary of company MCS: Japan

| Company | Job descriptions | Evaluation criteria | Organizational chart/hierarchy | Intentions |
|---------|------------------|---------------------|--------------------------------|------------|
| J-1     |                  | X                   | X                              | Explicit   |
| J-2     |                  |                     | X                              | Implicit   |
| J-3     |                  |                     | X                              | Implicit   |
| J-4     |                  |                     | X                              | Implicit   |
| J-5     | X                | X                   | X                              | Explicit   |
| J-6     |                  |                     | X                              | Implicit   |
| J-7     |                  |                     | X                              | Implicit   |
| J-8     |                  |                     | X                              | Implicit   |
| J-9     |                  |                     | X                              | Implicit   |
| J-10    |                  |                     | X                              | Implicit   |
| J-11    |                  |                     | X                              | Implicit   |

TABLE 3. Summary of company MCS: U.S.

| Company | Job descriptions | Evaluation criteria | Organizational chart/hierarchy | Intentions |
|---------|------------------|---------------------|--------------------------------|------------|
| U.S.-1  | X                | X                   | X                              | Explicit   |
| U.S.-2  | X                | X                   | X                              | Explicit   |
| U.S.-3  |                  | X                   |                                | Explicit   |
| U.S.-4  | X                | X                   | X                              | Explicit   |
| U.S.-5  |                  | X                   | X                              | Explicit   |
| U.S.-6  |                  | X                   |                                | Explicit   |
| U.S.-7  | X                | X                   |                                | Explicit   |
| U.S.-8  |                  |                     |                                | Implicit   |
| U.S.-9  |                  | X                   |                                | Implicit   |
| U.S.-10 |                  |                     | X                              | Implicit   |
| U.S.-11 |                  |                     | X                              | Implicit   |

scriptions, (b) evaluation criteria, (c) an organizational chart or hierarchy. Data were also collected on the existence of training programs. This provided a contrast and check to be sure that those firms which did not possess significant elements of a formal system were not devoid of *any* formal system.

As can be seen from Tables 2 and 3, the form of the formal control systems appears to be as predicted. All but two of the Japanese firms were evaluated as having implicit control systems. Researchers interested in planning and control in Japanese firms should find the pattern interesting. There is a uniform omission of job descriptions and evaluation criteria. These are two factors which would appear to be important for the formal evaluation of worker's performance.

Table 3 shows the opposite pattern. Seven of

the eleven U.S. firms were judged to have formal control systems which were labeled explicit. All seven of the explicit firms possessed elaborate evaluation criteria. This is in contrast to the Japanese firms where this was the most striking omission.

Thus it would appear from the qualitative data that the expectation that the Japanese firms would have informal control systems and the U.S. firms would have formal control systems has been met. Moreover, the area where one would expect the cooperative culture to reduce the need for formality, formal evaluation criteria, (see Ouchi, 1981) was absent from nine of the eleven Japanese firms. In contrast, this was true for only three of the eleven U.S. firms.

Table 4 reports the results of the comparison between the two worker groups on their per-

TABLE 4. Perceived measures of explicitness in MCS by workers

| System characteristics    | Monitoring subsystem       | Evaluation subsystem      | Reward subsystem          | Composite                |
|---------------------------|----------------------------|---------------------------|---------------------------|--------------------------|
| Role definition           | J* = 2.6<br>U.S.† = 2.0"   | J = 3.3<br>U.S. = 3.0§    | J = 3.0<br>U.S. = 2.5"    | J = 8.75<br>U.S. = 7.49" |
| Information dissemination | J = 2.56<br>U.S. = 2.48    | J = 2.60‡<br>U.S. = 2.80  | J = 1.87"<br>U.S. = 2.74  | J = 7.01"<br>U.S. = 7.93 |
| Performance recording     | J = 3.09<br>U.S. = 2.7"    | J = 1.66"<br>U.S. = 2.52  | J = 2.58"<br>U.S. = 3.14  | J = 7.10"<br>U.S. = 8.35 |
| Rule observation          | J = 2.79<br>U.S. = 2.83    | J = 3.25<br>U.S. = 2.92"  | J = 2.22"<br>U.S. = 2.56  | J = 8.24<br>U.S. = 8.28  |
| Composite                 | J = 10.93<br>U.S. = 10.01" | J = 10.76<br>U.S. = 11.13 | J = 9.41"<br>U.S. = 10.91 |                          |

1 = most explicit score, 5 = most implicit score.

\* J = Japanese.

† U.S. = United States.

‡  $p \leq 0.05$ ; §  $p \leq 0.01$ ; "  $p \leq 0.001$ .

Where the difference between the mean scores in a cell is significant, the more *explicit* is shown inside a box.

ceptions of the degree of formality present in the control system.<sup>6</sup> This was used to form hypothesis 3. In the earlier section it was argued that the *perceived* degree of explicitness should not be greater in all cases for U.S. workers than Japanese workers. This was because the culture could sensitize the workers in certain areas. Thus it was argued that two of the sets of hypotheses were directional. On *role definition* U.S. workers were expected to be more explicit (a *lower score*) than the Japanese workers. Conversely, because of the strong sensitivity to the nuances of communication in the Japanese culture, it was hypothesized that the Japanese workers would perceive their control systems as being more *explicit* (indicated by a lower score) on information dissemination.

The results reported in Table 4 generally are supportive of these two sets of hypotheses. In all three cases the U.S. workers reported that they perceived a more explicit *role definition* in the

control system. In the case of two of the three control subsystems, the Japanese workers reported that they perceived more explicit *information dissemination*. Corroborating these results, the composite ratings (the simple sum of all three systems' scores) were significant in both cases.

In the case of performance recording, Japanese workers found the performance recording aspect of the control system to be more explicit based on the composite score and in two of the three subsystems. This was despite the lack of extensive formal evaluation criteria in nine of the eleven Japanese firms. In contrast, and as the results in Tables 2 and 3 would suggest, the U.S. workers found the monitoring subsystem more explicit.

In the case of the other dimension, rule observation, it was argued that there was no basis for predicting what or if any significant differences would be found. In this case the results, at best,

<sup>6</sup> In the discussion of the perceived implicit-explicit nature of the control system we were unable to sort out the responses from firms whose control systems were atypical of their countries. This would be explicit in Japan and implicit in the U.S. This may lead to the U.S. results being less explicit and the converse for the Japanese. However, the effects were probably minimal. It also prevented comparing the perceptions of workers in the U.S. and Japan whose firms' MCSs were implicit.

are characterizable as interesting. While the difference in the composite scores for rule observation is nowhere near significant, this is attributed to the two significant, but opposite, findings. The Japanese workers found the rule observation more explicit *vis-à-vis* the reward subsystem and the U.S. workers found the evaluation subsystem more explicit. Thus, in this case the parts may be of more interest than the whole. These are the same areas where the conflict in worker-manager values existed in Table 1. The Japanese workers in Table 1 differed significantly from managers on the reward dimension. Similarly, half (four out of eight) of the differences between U.S. workers and managers were in the area of the evaluation subsystem.

Examining the data from the perspective of each subsystem, a similar pattern emerges. In the monitoring subsystem, the U.S. workers perceived the system to be more explicit. The explanation for these findings may lie in the higher degree of unionization and union power in the U.S. This may set limits on both what management can measure and what it is economically practical to measure for evaluating and rewarding workers. On the other hand the monitoring subsystem still may be useful to management.

Table 4 indicates that the Japanese workers perceived the reward subsystem to be more explicit in all four cases! This may be related to the lack of shared values found earlier and reported in Table 1. Again, one might conjecture that the strong ratings of Japanese workers relative to U.S. workers *vis-à-vis* the reward subsystem could mean that they fully understand and are very aware of the seniority based reward system (Table 4) and they do not like it (Table 1). The latter dimension being their point of departure from the managers' values and a source of friction between the two groups.

A second approach to whether the control systems are perceived to be explicit or implicit would be to look at all the scores that are 2.0 or less (explicit) and 3.0 or more (implicit). The reason for doing this is to weed out the ambiguous results near 2.5, the midpoint of the five point range. Using this approach, we can either examine the responses by country or compare

them. In Table 4 there are four out of the twelve cells where the Japanese workers responded on average 3.0 or greater. In only one case (information dissemination/reward subsystem) did their responses average less than 2.0. For the U.S. workers an even less illuminating pattern was present. In two cases the average response was 3.0 or greater and in one case it fell to 2.0. It is not obvious what these results indicate. It may be true that most workers perceive that on average the systems are not located near either extreme.

## SUMMARY

The study was intended to be exploratory in nature and to conduct field research on the implications of different cultural settings for the perception of a firm's MCS. Using a convenience sample of Japanese and U.S. firms, it would appear that the culture affects the nature of the formal control system. However, it would appear that the workers' perceptions of the control systems across the two countries are much less at variance with one another than might have been anticipated by looking solely at the formal MCSs.

The overall findings are consistent with the view that the presence of a culture which is homogeneous and possesses the critical dimension of cooperation would lead to less emphasis being placed on the "enforcing" of management's wishes. In turn, greater emphasis and resources can be spent on communicating across organizational levels and directing information to the proper individual or work group. The Japanese firms are able to do this because in the U.S. a significant proportion of the resources and effort embodied in the accounting information (and control) system is directed toward achieving behavioral congruence through bureaucratic rules and incentive systems. These aspects of the control system should not be necessary in a homogeneous culture with positive work attitudes.

A second issue which is raised by the findings, but is outside the scope of this project, is the extent to which Japanese firms are able to spend



less on control and control related activities than their counterparts in the U.S. do. It would appear that Japanese firms need to provide information to aid in decisions, while U.S. firms must provide the same information as well as the information needed to support the control elements of the system. This should result in a significant cost saving to Japanese firms. Such a saving may be large enough to defray all, or at least a significant portion of, the cost of "lifetime employment" offered Japanese workers.

A third issue raised by our findings is whether the homogeneity of values between workers and managers in Japanese firms will persist. The data, at the very least, hint at stress over the reward function between the two groups. Japanese workers and managers show the least agreement in this area. The data do not provide any basis for concluding whether or not this is a recent phenomenon. However, if it is a recent in origin, it would be worthwhile to observe how this stress affects other aspects of the system. We cannot discount the possibility that this always has been a source of friction and may have no impact on the form of the control relationship in Japanese firms.

Finally, the study raises a methodological issue *vis-à-vis* the various laboratory studies of Japanese management being conducted using U.S. college students. For example, see Young *et*

*al.* (1987). These studies attempt to examine or explain the behavior of Japanese workers in a laboratory setting using U.S. students as surrogates. However, unless they are able to simulate the relevant characteristics of the Japanese culture in their subjects, their findings only may be of interest for the insight they offer on how U.S. workers may respond to particular incentive and production schemes.

While the discussion up to this point has stressed the differences between the situations in the U.S. and Japan, an interesting study might be one which compared the values and attitudes found in a paired sample of firms from the two countries all of which use an implicit control system. How the firms view control, how they implement their systems and the role particular values play in the control process would be interesting questions to investigate. Do the firms approach control in the same manner? If so, culture may be a trivial factor in the process. If they do not, then culture may determine how the firms attempt to achieve the same goal.

In essence, the results of this study may be summarized best by pointing out that while they raise many issues worth considering, the study was exploratory and, therefore, tentative in nature. Given the difficulties of cross-cultural research, the next studies, also, should move tentatively and putatively.

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## APPENDIX A. INTERNATIONAL RESEARCH ON CULTURE AND ORGANIZATIONS

Below you will find 27 items designed to look at two areas. The first 12 items will measure the degree to which procedures are *written down* and *observed* in *your* company. Please respond to these items from the perspective of your company. The second 15 items are designed to measure your opinions about how organizations should be designed. Please respond to them from your own perspective.

There are also six demographic items which will help us in the analysis of the data.

Your help and cooperation in this international research are greatly appreciated.

Coral R. Snodgrass  
Graduate School of Business  
University of Pittsburgh

### Instructions

In the sections below, you will see a series of statements. Please indicate your agreement or disagreement by placing a checkmark in the parentheses according to the following:

|                      |                                     |                                     |                                     |                                     |                                     |                          |                          |
|----------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| Strongly agree       | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Agree                | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Undecided/don't know | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Disagree             | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Strongly disagree    | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/>            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please be sure to answer *all* items with one of the given responses.

### PART I

|                                                                                | 1                        | 2                        | 3                        | 4                        | 5                        |
|--------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                                                                                | SA                       | A                        | U/DK                     | D                        | SD                       |
| 1. Managers' salaries are based on length of service and position in the firm. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Rewards in this company are directly linked to meeting the budget.          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. This company keeps written records of budget variances.                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- ## PART II

- ### PART III

1. Age: (       )
2. Sex: a. male b. female
3. Length of time with the company: years \_\_\_\_ months \_\_\_\_
4. Education:
  - a. 8th grade
  - b. High school
  - c. College
  - d. Other
5. Area of major job content:
  - a. Production
  - b. Sales, marketing, and advertising
  - c. Finance and accounting
  - d. Personnel and training
  - e. Purchasing
  - f. Research and development
  - g. General administration
  - h. Other (please specify): \_\_\_\_\_
6. Level in the organization:
  - a. Non-management

- b. Foreman
- c. Section chief
- d. Middle management
- e. Upper management
- f. Other

7. Briefly describe your job responsibilities, if possible:

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## APPENDIX B. CLASSIFICATION OF COMPANIES

### 1. Line of business

| Line of business           | Japan | U.S. |
|----------------------------|-------|------|
| Basic metals               | 1     | 2    |
| Heavy/light manufacturing  | 9     | 8    |
| Manufacturing/construction | 1     | 1    |

### 2. Size — sales

| Sales (1983)      | Japan<br>(millions of Yen) | U.S.<br>(billions of U.S. \$) |
|-------------------|----------------------------|-------------------------------|
| LT 1MY/1B \$      |                            | 1                             |
| 1-1000MY/1-10B \$ | 7                          | 9                             |
| GT 1000MY/10B \$  | 4                          | 1                             |

### 3. Size — employees

| Number of employees | Japan | U.S. |
|---------------------|-------|------|
| LT 20,000           | 6     | 4    |
| 20,000-50,000       | 4     | 3    |
| GT 50,000           | 1     | 4    |

## MANAGERIAL ATTITUDE, MOTIVATION AND THE EFFECTIVENESS OF BUDGET PARTICIPATION\*

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### Abstract

This study empirically examined the effect of budget participation on managerial performance using a contingency theory approach. Contingent variables investigated included managerial attitude (towards their job and company) and motivation (to work). The results indicated that both variables moderated the effect of budget participation. Specifically, participation in the budgeting process by managers who reported a more favourable attitude or motivation, was associated with improved performance; whereas participation by managers exhibiting a less favourable attitude or motivation, was associated with hampered performance. These results support the fundamental argument that an organization may be better off following a budgeting style (participative or non-participative) that is congruent with its employee attitude and motivation.

A number of studies have investigated the relationship between budget participation and performance (Brownell & McInnes, 1986; Brownell, 1981, 1982; Kenis, 1979; Milani, 1975; Meyer, 1970); however, the exact nature of the relationship remains unclear, as the results reported by previous studies have been inconclusive and often contradictory. One way to reconcile these conflicting results is to investigate the hypothesised relationship utilising a contingency theory approach (Govindarajan, 1986). This approach involves accepting the idea that the nature of the relationship in question may vary from one situation to another.

In the present study a contingency theory approach was adopted to evaluate the effectiveness (in terms of managerial performance) of budget participation. The contingent variables investigated included managerial attitude and motivation. The results indicated that budget participation by managers who reported a more favourable attitude and/or motivation demonstrated improved performance. On the

other hand, budget participation by managers who exhibited a less favourable attitude and/or motivation demonstrated hampered performance.

The next section draws upon previous literature to develop a theoretical framework linking the variables of interest in order to provide the basis for the hypotheses summarized thereafter. The research method, results and discussion are presented in subsequent sections.

### THEORY DEVELOPMENT: BUDGET PARTICIPATION AND PERFORMANCE

The results of previous studies on the relationship between budget participation and managerial performance have been equivocal. Some studies have reported a positive, significant relationship between budget participation and performance (Brownell, 1981, 1982; Schuler & Kim, 1979; Bass & Leavitt, 1963; Becker & Green, 1962), whereas other studies observed

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no differences in performance between participatively and non-participatively set budgets (Kenis, 1979; Ivancevich, 1976; Steers, 1979; Milani, 1975; Foran & Decoster, 1974). Adding confusion, some studies have even reported a negative relationship between participation and performance, suggesting that authoritarian goal setting may lead to performance superior to that associated with participative goal setting (e.g. Blumenfield & Leidly, 1969; Bryan & Locke, 1967; Stedry, 1960; Morse & Reimer, 1956).

A problem facing researchers in this area is therefore a need to reconcile these conflicting results. One way of doing this is to adopt a contingency theory approach. Govindarajan (1986), for example, used environmental uncertainty as a contingent variable in evaluating the relationship between budget participation and performance. He reported that increased participation improved performance in environmentally highly uncertain situations, but hampered performance in low uncertain situations. Brownell (1981) found that increased participation by employees who were "internals" (on the locus of control scale) resulted in improved performance, whereas participation by employees who were "externals" (on the same scale) hampered performance. Similarly, Hofstede (1967) found that increased participation by employees having a high need for independence was associated with improved performance, but no such relationship could be obtained in the case of employees who had a low need for independence (see also Vroom, 1959).

With regard to attitude and motivation, researchers have commonly treated these constructs as outcome variables in evaluating the effectiveness of budgetary participation. A reason underlying this common assumption is the expectation that participation should positively affect these variables as outcome criteria. However, the results to date are generally inconsistent. Although Collins (1978) and Vroom (1959), for example, reported a significant, positive relationship between participation and employee attitude, Ivancevich (1979) found no such relationship. In the case of motivation, a similarly equivocal situation apparently exists.

While Lawler & Hackman (1979), Siegal & Ruh (1973), Patchen (1970) and Hofstede (1967) reported a significant and positive relationship between participation and motivation, Brownell (1983), Ivancevich (1979) and Staw (1977) did not observe such a relationship.

One potential explanation for these inconclusive results is that changing (improving) employee attitude and motivation through budgetary participation, or by other means, assumes that individuals are only the recipients of stimuli, and fails to consider that individuals may be more than merely passive recipients of such stimuli. A more realistic view is that since individuals themselves may be the augmentors of stimuli (see Milton *et al.*, 1984), an organization may be better off following a budgeting style (participative or non-participative) that is congruent with its employee attitude and motivation.

Two exceptions to the treatment of employee attitude and motivation as outcome variables are Brownell & McInnes (1986) and Milani (1975). Brownell & McInnes examined the potential of employee motivation as a construct intervening in the relationship between budget participation and performance. The term intervening is used here in the sense that the relationship between budget participation and performance exists partly via motivation as shown in Fig. 1 (see

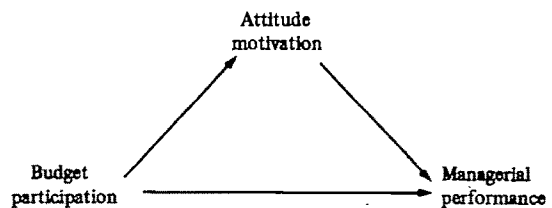


Fig. 1. Model sharing motivation and attitude as intervening variables. (Adapted from Brownell & McInnes, 1986.)

Brownell & McInnes, 1986). Contrary to their expectations, motivation did not play a significant intervening role, i.e. the relationship between participation and performance did not exist via motivation. In another study, Milani (1975) examined the potential of employee attitude as a construct intervening the relationship between budget participation and perform-

ance (see Fig. 1). Milani found that attitude, like motivation, did not play an intervening role in explaining the relationship.

Unlike these earlier studies the present study examined the potential of managerial attitude and motivation as constructs *moderating* the relationship between budget participation and performance. Here the term moderating is used in the sense that attitude and motivation are related neither to budget participation nor performance but to the relationship between these latter variables as shown in Fig. 2 (see Gul, 1984).

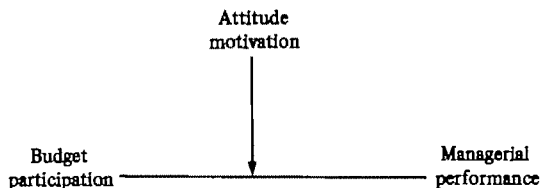


Fig. 2. Model showing attitude and motivation as moderating variables. (Adapted from Gul, 1974.)

Following Festinger's (1957) theory of cognitive dissonance, it may be argued that employees who have a more favourable (high) attitude or motivation develop a cognitive dissonance or psychological uneasiness if their performance is low (below expected level). To reduce this dissonance, they attempt to improve their performance (Hamner & Organ, 1978; Calder & Ross, 1976). Budget participation as a mechanism for information exchange enables employees to obtain a clearer understanding of their jobs, thereby helping them to improve their performance (Hopwood, 1976). In contrast, employees who have a less favourable (low) attitude or motivation may not develop such a cognitive dissonance due to their low performances. Consequently, these employees are less likely to voluntarily attempt to improve their performance through budget participation or by other means. Alternatively, an authoritarian device (a non-participative budget, for example) may be more

effective in improving performance in this case.

Based on the above discussion, it can be argued that budget participation may be effective in the case of employees who have a more favourable attitude or motivation but may be ineffective in the case of employees who have a less favourable attitude or motivation.

### Hypotheses

To summarize, it is argued that our understanding of the relationship between budget participation and performance can be improved by considering the moderating role that attitude and motivation have on the relationship. To establish the moderating role of attitude and motivation, it has been argued that budget participation by employees who have a more favourable (high) attitude or motivation may have a significant, positive relationship with performance. In contrast, budget participation by employees who have a less favourable (low) attitude or motivation may not have such a relationship with performance. These arguments may be summarized in the following hypotheses:

*H<sub>1</sub>*: There is an interaction between budget participation and attitude affecting managerial performance. Managers whose budget participation is congruent with their attitude will demonstrate improved performance, while managers whose budget participation is incongruent with their attitude will demonstrate hampered performance.<sup>1</sup>

*H<sub>2</sub>*: There is an interaction between budget participation and motivation affecting managerial performance. Managers whose budget participation is congruent with their motivation will demonstrate improved performance, while managers whose budget participation is incongruent with their motivation will demonstrate hampered performance.

### METHOD

The research method involved administering a questionnaire to a sample of lower and middle

<sup>1</sup> There is no theoretical justification for expecting a two way interaction between attitude and motivation or a three way interaction among budget participation, attitude and motivation that affect performance. To validate this view, statistical tests were undertaken and the results are reported later in this paper.

level managers in a large company. The company was originally incorporated in Australia as a mining and associated investments company about a decade ago. In recent years it has emerged as a major Australian company, mainly through the acquisition of other companies doing business in diversified fields. The company is listed on the Australian Stock Exchange, operates nationally in Australia and consists of five operating divisions engaged in the importing and distribution of automobiles, and the manufacturing and selling of furniture, plastic building products, gardening equipment and electrical goods.

A series of meetings with the corporate management indicated that each of the divisions was treated as a profit centre, with the divisional managers being given considerable autonomy in running their divisions. All of the divisions have been using budgets for several years to plan their operations and to evaluate performance. Moreover, the corporate management appeared to have been interested in encouraging a participative style of budgeting in all divisions.

The distribution of the questionnaire was handled via the internal mailing system of the company, under a corporate cover letter encouraging cooperation in the study. Each respondent was provided with a stamped, self-addressed envelope to return the completed questionnaire direct to the researcher. The sample consisted of 115 middle and lower level managers from various functional areas: sales, marketing, production, R&D, purchase, maintenance, personnel, administration and accounts and finance. However, selection of the respondents was made by the division management, so the sample was not strictly random. In selecting respondents, the management was requested to choose samples of managers from all functional areas.

The questionnaire was fully completed by 83 managers, yielding a response rate of 72%. These managers were from sales (18%), market-

ing (6%), production (19%), R&D (5%), purchasing (7%), maintenance (10%), personnel (6%), administration (12%) and accounts and finance (17%). The respondents had an average tenure of 7 years (ranging from 1 to 20 years) with the corporation and supervised on average 12 subordinates (ranging from 1 to 40).

### *The measurement of variables*

The variables incorporated into the questionnaire were participation, attitude, motivation and performance.

**Budget participation.** Milani's (1975) measure of budget participation was employed to assess the amount of influence and involvement an individual employee perceives to have on a jointly-set budget (Brownell, 1979). The use of this instrument enables the results of the present study to be compared with those of other studies of budget participation. Respondents are requested to rate their level of budget participation under each of the six items on a 7-point Likert-type scale. The overall score for the construct is the sum of the scores under each of the six items. The use of the measure in the present study yielded a Cronbach alpha coefficient of internal reliability of 0.89 which compares favourably with other studies of this type<sup>2</sup> (see Brownell, 1985).

**Attitude.** A literature review indicated that, in a budgetary situation, Milani (1975) offers the most clear and complete definition of attitude. He defined attitude in terms of employees' feelings and predispositions towards their jobs (attitude towards job) and employer (attitude towards company) in a budgetary context. Attitude towards the job is measured using a 16-item instrument adapted by Milani (1975) from a larger instrument developed by Miller (1934). Examples of items included in this measure are: "I can think of few jobs I would rather have than this one" and "This job is disliked by everyone".

<sup>2</sup> A factor analysis using the scores for the measure in this study yielded one eigen value greater than unity resulting in the extraction of one factor. The factor had an eigen value of 3.82 and explained 64% of variance in participation. The factor loadings of items 1-6 in the instrument were 0.83, 0.57, 0.70, 0.89, 0.92 and 0.85, respectively.



Attitude towards the company is measured using a 10-item instrument also adapted by Milani (1975) from an instrument developed by Bergen (1939). Examples of items included in this measure are: "A large number of the employees would leave here if they could get good jobs elsewhere", and "On the whole, the company treats us about as well as we deserve". The score for a manager's overall attitude is the sum of scores for his attitude towards the job and attitude towards the company (Shaw & Wright, 1967, pp. 130–132; Tiffin, 1952, pp. 465–471). A check of internal reliability for the measure in this study yielded a Cronbach alpha coefficient of 0.61 which is an acceptably high level (Nunnally, 1967).

**Motivation.** Work motivation was measured using an instrument developed by Lawler & Suttle (1973). In the current study, work motivation was viewed in the context of an expectancy paradigm, and thus as a function of the effort–performance ( $E \rightarrow P$ ) expectancy, the performance–outcome ( $P \rightarrow O$ ) expectancy and valence ( $V$ ) (Ferris, 1977; Vroom, 1964). An example of items measuring ( $E \rightarrow P$ ) expectancy is "Working hard  $\rightarrow$  Good job performance", and ( $P \rightarrow O$ ) expectancy is "Working hard  $\rightarrow$  High pay". The valence ( $V$ ) is measured by the extent of desirability for, say, "High pay". Using the instrument, respondents report their expectancies on a 7-point scale ranging from 1 (never) to 7 (always) and valences on a 9-point scale ranging from 1 (extremely undesirable) to 9 (extremely desirable). The overall score for motivation is determined by combining the expectancies and valence.<sup>3</sup> Use of the expectancy measure in this study yielded an internal reliability coefficient of 0.74 for ( $E \rightarrow P$ ) expectancy and 0.86 for ( $P \rightarrow O$ ) expectancy. The internal reliability coefficient

obtained for the valence measure was 0.76. These coefficients compare favourably with previous results (Ferris, 1977).

**Performance.** Managerial performance was measured using superior ratings. Self-ratings were not used to avoid the possibility of having a higher leniency error (higher mean values) and a lower variability error (restriction of range) in the score (see Thornton, 1968; Prien & Liske, 1962). Moreover, since the participants in this study held managerial positions, an evaluation of their performance on a more global basis was considered important. The superior ratings aimed to provide such a wider evaluation of managerial performance (Heneman, 1974).

A list containing the names and addresses of superiors for the 83 participating managers in the sample was obtained from the divisional managers' office. Also information on the period for which each of the participating managers had been working under his current superior prior to the study was also obtained. A period of 6 months was considered necessary for a superior to form an accurate opinion about his subordinate's performance. This criterion was met by 60 of the 83 participating managers. The superior of each of these 60 managers was then requested to evaluate as accurately as possible the overall performance of the participating manager directly reporting to him.<sup>4</sup> The superiors were provided with a 9-point Likert-type scale ranging from below average (1) to above average performance (9). Each of the respondent superiors was assured of anonymity and promised that the data collected would be used only for the purpose of the study. Superior ratings of performance for 51 participating managers were obtained. Thus, the final sample size used for analysis was 51.

<sup>3</sup> Motivation ( $M$ ) = ( $E \rightarrow P$ ) [ $(P \rightarrow O) (V)$ ] where:

( $E \rightarrow P$ ) is the effort–performance expectancy; ( $P \rightarrow O$ ) is the performance–outcome expectancy; and ( $V$ ) is the valence or desirability of a reward.

<sup>4</sup> In addition to the assurance of anonymity and the promise for using the data only for the purpose of the study, the superiors were specifically requested to evaluate performance of a participating manager only if they (superiors) could do it without any personal prejudice. Four superiors expressed their unwillingness to evaluate seven of the participating managers' performance on personal grounds.

## RESULTS

Table 1 presents descriptive statistics and Table 2 presents the correlation matrix for the variables in the study. The absence of significant multi-collinearity amongst the variables (see Nie *et al.*, 1975, p. 340) indicates that regression analysis may be appropriately used to test hypotheses  $H_1$  and  $H_2$  (Schoonhoven, 1981; Blalock, 1972). It may be noted that the multiplier interaction model presented in equation (1) is efficient in testing an interaction effect (Govindarajan, 1986; Schoonhoven, 1981; Allison, 1977).

*Hypothesis H<sub>1</sub>*

$H_1$  was tested using the regression equation:

$$Y = a + b_1X_1 + b_2X_2 + b_4X_1X_2 + e \quad (1)$$

where:

$Y$  = managerial performance;

$X_1$  = budget participation (rescaled, mean = 0);<sup>5</sup>

$X_2$  = attitude (rescaled, mean = 0);

$X_1X_2$  = interaction term.

A significant coefficient  $b_4$  in equation (1) would indicate an interaction between budget participation and attitude affecting performance, thus leading to an acceptance of hypothesis  $H_1$ .

The results presented in Table 3 reveal just such a significant interaction between participation and attitudes affecting performance, therefore permitting acceptance of  $H_1$ .

TABLE 1. Descriptive statistics

| Variables     | Mean  | S.D. | Theoretical range | Actual range |
|---------------|-------|------|-------------------|--------------|
| Performance   | 6.73  | 1.16 | 1-9               | 4-9          |
| Participation | 30.57 | 7.80 | 6-42              | 10-40        |
| Attitude      | 6.84  | 1.18 | 0-11              | 3-9          |
| Motivation    | 3.80  | 1.59 | 1-N/A             | 1-10         |

TABLE 2. Matrix of intercorrelations

|       | Performance $Y$ | Participation $X_1$ | Attitude $X_2$ | Motivation $X_3$ | $X_1(X_1X_2)$ | $X_2(X_1X_3)$ |
|-------|-----------------|---------------------|----------------|------------------|---------------|---------------|
| $Y$   | 1.00            |                     |                |                  |               |               |
| $X_1$ | -0.11           | 1.00                |                |                  |               |               |
| $X_2$ | -0.15           | 0.29*               | 1.00           |                  |               |               |
| $X_3$ | -0.10           | 0.02                | 0.18*          | 1.00             |               |               |
| $X_4$ | 0.35*           | -0.18*              | -0.19*         | -0.10            | 1.00          |               |
| $X_5$ | 0.28*           | -0.04               | -0.10          | -0.12            | 0.14          | 1.00          |

\*  $P < 0.05$ .

TABLE 3. Test of  $H_1$ : interaction between participation and attitude affecting performance

| Variables            | Coefficients $B$ | Coefficient value | S.E. | $T^*$ Statistical value | Significance $P$ |
|----------------------|------------------|-------------------|------|-------------------------|------------------|
| $X_1$ Participation  | $b_1$            | -0.04             | 0.21 | 0.19                    | NS               |
| $X_2$ Attitude       | $b_2$            | -0.08             | 0.14 | 0.56                    | NS               |
| $X_1X_2$ Interaction | $b_4$            | 0.47              | 0.20 | 2.35                    | < 0.02           |
| Constant             | $a$              | 6.60              | 0.17 | 38.89                   | < 0.01           |

$R^2 = 13\%$ ;  $F_{(3,47)} = 2.33$ ;  $P < 0.08$ ;  $n = 51$ .

\* One tailed test.

<sup>5</sup> Application of the deviation score method is useful to test the proposition in this study that managerial performance should improve in cases of managers whose budget participation is congruent (a good fit) with their attitude or motivation. A low participation (negative rescaled value), for example, by managers who have a less favourable attitude (again a negative rescaled value) is a congruent situation and the interaction term is positive. A similar result is expected in cases of high participation and more favourable attitude or motivation. However, in cases where participation is high but attitude or motivation is less favourable or vice versa, an incongruent (a misfit) situation exists resulting in a negative interaction term which is expected to be associated with hampered performance.

**Hypothesis H<sub>2</sub>**

H<sub>2</sub> was tested by fitting an equation identical to equation (1), substituting the motivation (X<sub>3</sub>) data for those on attitude.

The results presented in Table 4 reveal a significant interaction between budget participation and motivation permitting acceptance of H<sub>2</sub>.

data from the study. Results presented in Appendices (1) and (2) reveal the absence of such interactions.

**A further analysis of the interaction effects**

In order to facilitate understanding of the interaction effects, each of the interaction terms was elaborated mathematically, as shown in equ-

TABLE 4. Test of H<sub>2</sub>: interaction between participation and attitude affecting performance

|                               | Variables     | Coefficients B | Coefficient value | S.E. | T* Statistical value | Significance P |
|-------------------------------|---------------|----------------|-------------------|------|----------------------|----------------|
| X <sub>1</sub>                | Participation | b <sub>1</sub> | -0.14             | 0.20 | 0.71                 | NS             |
| X <sub>3</sub>                | Motivation    | b <sub>3</sub> | -0.05             | 0.10 | 0.47                 | NS             |
| X <sub>1</sub> X <sub>3</sub> | Interaction   | b <sub>5</sub> | 0.30              | 0.15 | 2.00                 | < 0.05         |
|                               | Constant      | a              | 6.72              | 0.16 | 42.93                | < 0.01         |

R<sup>2</sup> = 9.4%; F<sub>(3,47)</sub> = 1.70; NS = not significant; n = 51.

Earlier it was argued that a significant two way interaction between attitude and motivation (the two contingent variables), and a three way interaction among participation, attitude and motivation affecting performance should not be expected, due to an absence of theoretical support. This argument was statistically tested using

equations (2) and (3) below, and then graphically presented in Figs 3 and 4. The steps taken for this analysis are: (a) taking the partial derivative of equation (1) over X<sub>1</sub>, (b) determining the value of X<sub>2</sub> (the inflection point) at which this variable would have no moderating effect on the relationship between X<sub>1</sub> and Y, and (c) plotting the

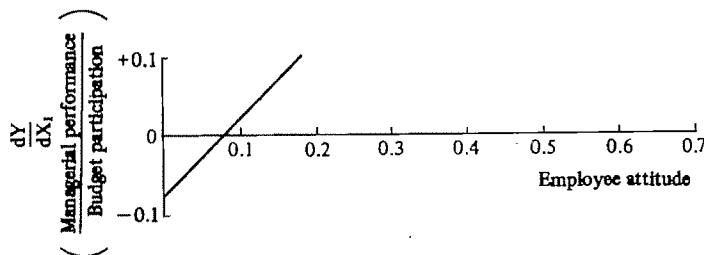


Fig. 3. Interaction between budget participation and employee attitude affecting managerial performance.

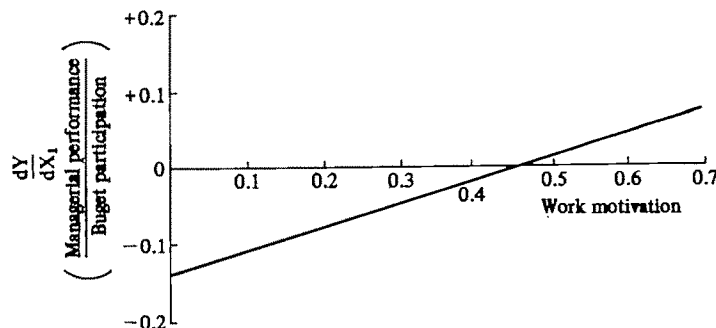


Fig. 4. Interaction between budget participation and work motivation affecting managerial performance.

joint effect of the main and interaction terms (see Schoonhoven, 1981; Southwood, 1978).

The use of steps (a) and (b) above produced equations (2) and (3) as:

$$d/dX_1 = b_2 + b_4 X_2 \quad (2)$$

and

$$X_2 = -b_1/b_4 \quad (3)$$

Substituting the values for  $b_1$  and  $b_4$  from Table 3 into equation (3) produced  $X_2 = 0.08$  (the inflection point). Again, substituting the values for  $b_1$  and  $b_4$  from Table 3 and values for  $X_2$  into equation (2), the joint effect of the main and interaction terms was determined.

The results presented in Fig. 3 reveal that the nature of the relationship between participation and performance changes due to the moderating effect of attitude on such a relationship. For high attitude scores, i.e. attitude values greater than 6.92 (6.84, the mean + 0.08), budget participation was associated with improved managerial performance, whereas for attitude values less than 6.92 (low attitude), budget participation was associated with hampered managerial performance. For attitude values approximately equal to 6.92 the association between budget participation and managerial performance was found to be neutral.

Using steps (a), (b) and (c) above, it was found that budget participation was associated with improved managerial performance for high motivation, i.e. motivation values greater than 4.26 (3.80, the mean + 0.46, the inflection point) whereas budget participation was associated with hampered managerial performance for motivation values less than 4.26 (low motivation). For motivation values approximately equal to 4.26, the association between budget participation and performance was neutral. Figure 4 presents the results. Note that the values which are 6.92 for attitude and 4.26 for motivation are (a) within the range of values observed in this study, and (b) close to the respective mean values for attitude and motivation (see Table 1). These values therefore represent the

average attitude and motivation respectively in this study.

The slope of the line plotting the joint effect of the main and interaction terms in Fig. 3 is higher than the slope of that line in Fig. 4. This difference in slope indicates that the moderating effect of attitude on the participation-performance relationship is stronger than that of motivation.

## DISCUSSION

As expected, a significant interaction between budget participation and attitude affecting managerial performance was obtained. The results revealed that budget participation by managers who had a more favourable (high) attitude was associated with improved performance while that by managers who had a less favourable (low) attitude was associated with hampered performance. Thus, managers' attitudes toward their jobs and employer appear to be a contingent variable moderating the relationship between their budget participation and performance. These results offer an explanation why Milani (1975) did not obtain the results he expected since he tested the intervening role of attitude in an effort to explain the relationship between participation and performance.

Motivation was also found to significantly moderate the relationship between budget participation and performance. The results revealed that budget participation by managers who had a more favourable (high) motivation was associated with improved performance, while that by managers who had a less favourable (low) motivation was associated with hampered performance. Thus, managers' motivation also appears to be a contingent variable. Once again, this finding offers an explanation for the results reported by Brownell & McInnes (1986) who tested the intervening role of motivation in an attempt to explain the relationship between budget participation and performance, and found that motivation was not a significant intervening variable.

The existence of a significant moderating role

of attitude and motivation as discussed above supports the fundamental argument made earlier in this paper that an organization may be better off following a budgeting style (participative or non-participative) that is congruent with its employee attitude and motivation. The results imply that an imposed or a non-participative budgeting may be more effective (in terms of performance) in the case of managers who have a less favourable (low) attitude and/or motivation (see Figs 3 and 4). On the other hand, a participative budgeting may be more effective in the case of managers who have a more favourable (high) attitude and/or motivation. However, it should be noted that since this study used Milani's (1975) participation continuum scale, the possible effect of a non-participative or authoritarian budgeting on performance could not be explicitly tested. Future research needs to pursue this issue further.

Beyond the usual limitations of survey research (Brownell, 1985), a number of issues worth discussing are:

(1) Data for the study were collected from various departments in a large company. Although the departments appeared to have a reasonable amount of autonomy, the top management was likely to have had a significant influence on how the departments were managed. There may therefore be factors at work which are specific to the participant company, so some

caution is necessary before generalizing the results.

(2) Thurstone & Chave's (1929) theory and technique, on which the attitude scale is based, has been criticised because the same score for two individuals may not necessarily mean they have an identical attitude (see Milani, 1975; Shaw & Wright, 1967; Tiffin, 1957). Moreover, although the internal reliability coefficient (0.61) for the scale measuring employee attitude is satisfactory (Nunnally, 1967; Ferris, 1977), it is not very high. Unfortunately previous researchers who have used the scale have not reported their reliability coefficient (see, for example, Milani, 1975).

(3) An employee's performance may be influenced by variables such as group behavior, job security, working conditions, reward systems and top managements' policies not investigated in this study. These therefore may be other contingent variables moderating the participation-performance relationship.

Notwithstanding such limitations, the results help to reconcile the results reported by previous research in this area and thereby make some contribution to improve our understanding of the effect of participation on managerial performance in a budgetary context. Certainly on the basis of the present findings it would appear that an organisation is likely to be better off following a budgeting style that is congruent with its employee attitude and motivation.

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APPENDIX 1. Interaction between attitude and motivation affecting performance

| Variables |             | Coefficients <i>B</i> | Coefficient value | S.E. | <i>T</i> * Statistical value | Significance <i>P</i> |
|-----------|-------------|-----------------------|-------------------|------|------------------------------|-----------------------|
| $X_2$     | Attitude    | $b_1$                 | -0.14             | 0.14 | 0.96                         | NS                    |
| $X_3$     | Motivation  | $b_2$                 | -0.06             | 0.11 | 0.58                         | NS                    |
| $X_2X_3$  | Interaction | $b_6$                 | 0.03              | 0.09 | 0.28                         | NS                    |
|           | Constant    | <i>a</i>              | 6.72              | 0.16 | 40.78                        | < 0.01                |

$R^2 = 3\%$ ;  $F_{(3,47)} = 0.50$ ; NS = not significant;  $n = 51$ .

\* One tailed test.

APPENDIX 2. Interaction among participation, attitude and motivation affecting performance

| Variables   |               | Coefficients <i>B</i> | Coefficient value | S.E. | <i>T</i> * Statistical value | Significance <i>P</i> |
|-------------|---------------|-----------------------|-------------------|------|------------------------------|-----------------------|
| $X_1$       | Participation | $b_1$                 | -0.09             | 0.22 | 0.40                         | NS                    |
| $X_2$       | Attitude      | $b_2$                 | -0.06             | 0.14 | 0.44                         | NS                    |
| $X_3$       | Motivation    | $b_3$                 | -0.06             | 0.12 | 0.52                         | NS                    |
| $X_1X_2$    | Interaction   | $b_4$                 | 0.38              | 0.20 | 1.88                         | < 0.06                |
| $X_1X_3$    | Interaction   | $b_5$                 | 0.25              | 0.16 | 1.56                         | NS                    |
| $X_2X_3$    | Interaction   | $b_6$                 | -0.01             | 0.10 | 0.12                         | NS                    |
| $X_1X_2X_3$ | Interaction   | $b_7$                 | 0.17              | 0.15 | 1.18                         | NS                    |
|             | Constant      | <i>a</i>              | 6.64              | 1.68 | 39.64                        | < 0.01                |

$R^2 = 22\%$ ;  $F_{(7,43)} = 1.68$ ; NS = not significant;  $n = 51$ .

\*One tailed test.

## ACCOUNTING AS REALITY CONSTRUCTION: TOWARDS A NEW EPISTEMOLOGY FOR ACCOUNTING PRACTICE\*

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### Abstract

Accountants often see themselves as objective appraisers of reality, representing reality "as is". This paper takes a different view, arguing that accountants typically construct reality in limited and one-sided ways. It shows that the idea of objectivity in accounting is largely a myth, and one which stands in the way of interesting future developments in the discipline. The paper develops an alternative perspective on the nature of the accounting process, building on insights regarding the interpretive and metaphorical nature of accounting, and arguing that accounting should be approached as a form of "dialogue" through which accountants can construct, "read" and probe situations in a variety of ways.

I'd like you to visualize an Escher lithograph. Perhaps it is *Hand With Reflecting Globe*, which features Escher looking at himself in a crystal ball (Fig. 1). The artist has created an image of himself looking at himself which binds the viewer into the picture as if he or she were actually standing in Escher's shoes.

In this lithograph the artist is making a fundamental epistemological point. It is that he as an artist, and we as everyday observers and participants in life, are active producers of what we see and experience. In a broad sense, all knowledge is a matter of perspective. Just as an artist makes a limited representation of the "reality" captured on his or her canvas, the knowledge generated by the natural scientist, by the social scientist, or by the layperson in the course of everyday experience, is always a limited, partial knowledge. While this knowledge usually "says something", it also leaves a great deal unsaid. And what is said only rings true from the standpoint of a limited view: just as the laws of physics only apply within clearly defined parameters.<sup>1</sup>

I am evoking this imagery as a basis for the argument that follows, since I want to focus on the problems faced by accountants in representing the reality of the situations they wish to "account for". Accountants often see themselves as engaged in an objective, value-free, technical enterprise, representing reality "as is". But in fact, they are subjective "constructors of reality": presenting and representing the situations in limited and one-sided ways. They are not just technicians practising a technical craft. They are part of a much broader process of reality construction, producing partial and rather one-sided views of reality, exactly as an artist is obliged to produce a partial view of the reality he or she wishes to represent.

By appreciating and exploring this dimension of the accounting process, accountants have a means of developing a new epistemology of accounting that will emphasize the interpretive as opposed to the supposedly "objective" aspects of the discipline, perhaps in a way that will help broaden and deepen the accountants' contributions to economic and social life.

\*Based on an invited address to the Tenth Congress of the European Accounting Association, London, 25 March 1987. I am indebted to Stan Davis and Graham Morgan for their help in some of the research leading to this paper.

<sup>1</sup> I have explored this theme at great length in Morgan (1983), showing how different approaches to social research capture inherently limited aspects of the situations to which they are applied.



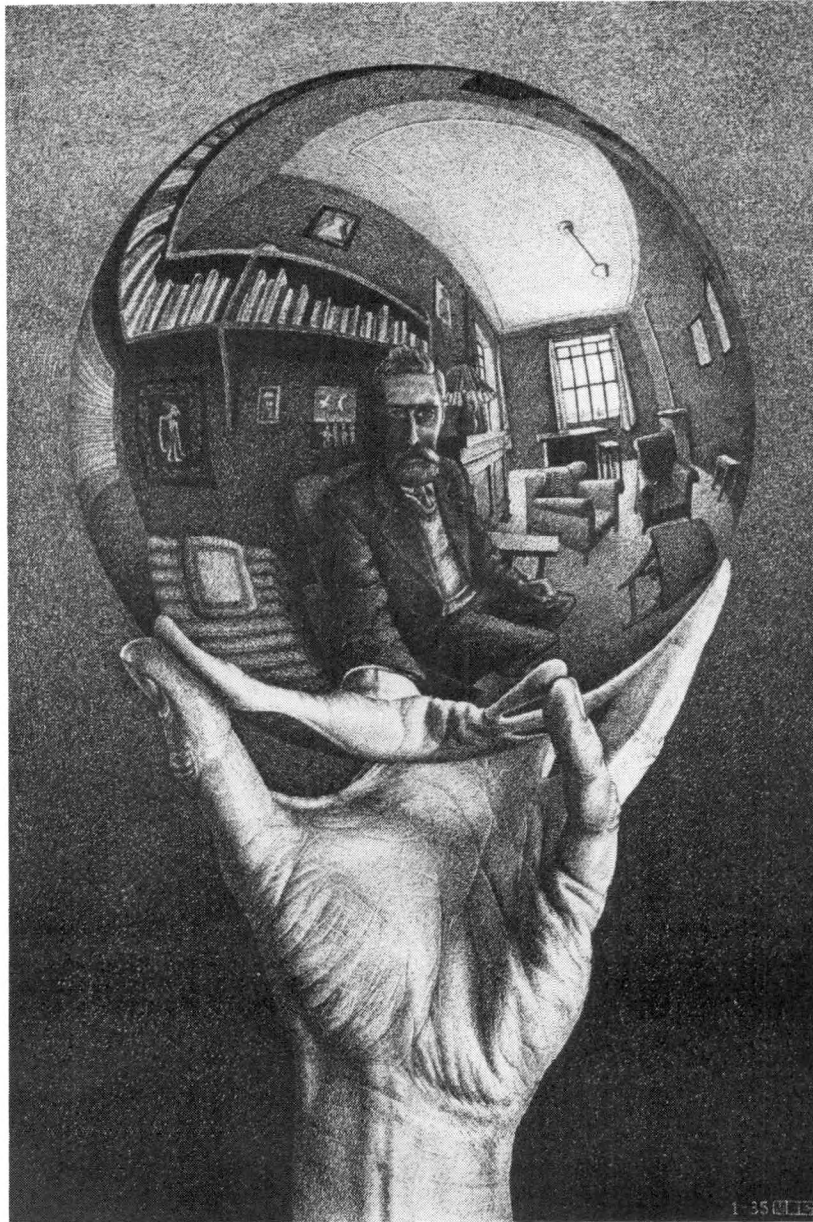


Fig. 1. Hand with reflecting globe: self-portrait by M. C. Escher (lithograph, 1935). Reprinted by permission of Haags Gemeentemuseum, The Hague, courtesy of Vopal Gallery, San Francisco and New York City, and by permission of the heirs of M. C. Escher, c/o Cordon Arts-Baarn, Holland.

#### THE METAPHORICAL NATURE OF KNOWLEDGE

If one wishes to get a fresh view of one's discipline, it is often a good idea to try and see it from the outside. So let's look beyond our im-

mediate concerns as accountants and examine some recent developments in the field of organization theory, where the problems of perspective and interpretation parallel those faced in accounting and in the production of knowledge generally.

Elsewhere (Morgan, 1980, 1986), I have suggested that organization theory is a metaphorical enterprise, and that its history is really a story of broadening metaphorical development. For example, early theories of organization built on the image that organizations are machines. Interest focussed on understanding relations between structure, technology, goals and efficiency, on the premise that organizations can be rationally designed as structures of clearly defined parts, coordinated and controlled in pursuit of pre-specified goals. This created an internally oriented view of organizations that made efficient organization a question of good bureaucratic design. The theory had strengths, but also limitations requiring new metaphorical perspectives to put them aright. Hence, mechanistic theorizing was quickly supplemented by ideas generated through organic imagery focussing attention on the flexible and adaptive properties of organisms. By developing the idea that organizations are more like organisms than machines, theorists began to emphasize that an organization's "environment" was all important, and that the main task facing organizations was that of survival. Like organisms, organizations became viewed as open systems with sets of "needs" that must be satisfied. Looking towards the external environment, it was observed that just as polar bears fare well in cold climates, and camels in deserts, different social, technical and economic environments favour different forms of organization. A contingency theory of organization developed, emphasizing the importance of achieving a good fit between organization and environment, noting that while bureaucracies are able to survive quite well in stable environments, under conditions of turbulence more organic forms are often more appropriate. In the process, modified forms of Darwinism began to replace the principles of engineering and mechanism as the primary source of inspiration for ideas on organization and management.

Since the late 1970s other metaphors have also exerted an increasing influence on organization theory. For example, much credence is now given to the idea that organizations are cultures:

mini-societies with their own systems of ideology, myth, ritual, ceremony and other forms of symbolism. Under the influence of this metaphor, corporate culture is being viewed as the key factor influencing the success of organizations, and managers, particularly those at a senior level, are encouraged to develop skills in shaping the core values and beliefs that are to guide organizational practice. As witnessed by the success of books like *In Search of Excellence* (Peters & Waterman, 1982), the metaphor has captured the thinking of many practising managers in a major way and, at least in North America, is providing the basis for a new orthodoxy.

Other metaphors have also been explored to create important insights on the politics of organization, on the cybernetic properties of decision-making, on the ugly features associated with exploitation and domination, and so on.

This short review is intended to be no more than illustrative. The point is that our understanding of organization is based on the use of metaphors which generate important insights that always have clearly defined limitations. Different metaphors grasp and highlight different aspects of organization but, in the process, tend to hide or distort others. A full understanding of organization thus requires that we find ways of integrating the many and often paradoxical insights that our theories and explanations create.

My own solution to the problem has been to argue that this can be achieved by explicitly recognizing that organizations are many things at once (Morgan, 1986). They are enterprises that collectively have to engage in certain activities to survive. They provide the scene for individual careerism and interpersonal politics. They are often reduced to battlegrounds between rival factions. They are arenas where people construct meaning and engage in all kinds of symbolically significant activities. And so on. The way we understand these many dimensions, and judge their significance is a matter of perspective, shaped by all kinds of motivations and intentions. If we are charged with managing an organization we may find one perspective more helpful than another. If our purpose is

to critique or to revolutionize existing social relations, we are more likely to favour and adopt yet another. Like artists, we face the problem that whatever perspective we choose to adopt, others are squeezed from view.

An understanding of the metaphorical nature of knowledge thus leads to a basic problem of epistemology. It leads us to recognize that human agency and the limitations imposed by perspective are fundamental in the generation of knowledge, and that our knowledge always falls short in representing the full texture of reality. Our lot as human beings dealing with a complex, multi-dimensional and paradoxical world, is that our knowledge can do no more than create a weak and rather uni-dimensional representation of that world. Though achievements in technology may convince us that we are much more knowledgeable than we actually are — since the ability to manipulate with predictable results is *not* a true measure of knowledge or understanding — our knowledge always falls short of the ideal state which philosophers from Plato to Hegel have encouraged us to achieve.

#### ACCOUNTING AS A METAPHORICAL ENTERPRISE

It may seem that our discussion has brought us a long way from the topic of accounting. But we are right at its heart because accounting is ultimately concerned with the problems of representation and “accounting for”. Like organization theorists, accountants ultimately have to represent complex multi-dimensional realities through metaphorical constructs that are always limited and incomplete.

Accounting practice is framed by an overarching metaphor encouraging a numerical view of reality. Just as early organization theorists attempted to represent organizations through

bureaucratic principles deriving from the image that organizations are machines, accountants try to represent organizations and their activities in terms of numbers. This is metaphorical. And like all use of metaphor, it gives but a partial and incomplete representation of the reality to which the numbers relate. The numerical view highlights those aspects of organizational reality that are quantifiable and built into the accounting framework (e.g. flows of costs, revenues and other values), but ignores those aspects of organizational reality that are not quantifiable in this way. Just as we might attempt to rate the quality of last night's dinner on a scale of 1–10, and in giving it “a 9” capture that it was indeed a very good meal, the accountant's numerical form of representation provides a very “thin” and limited characterization. It leaves much of the quality and over-all experience of the meal out of account. The metaphor “it was a 9” remains silent on so many things.

We are addressing here one of the major problems in accounting practice. Accountants have long recognized the limitations of numerical modes of representation, but have been hamstrung in their attempts to overcome them because the numerical view has been equated with an *objective view*. The idea that accountants represent reality “as is” through the means of numbers that are objective and value free, has clouded the much more important insight that accountants are always engaged in *interpreting* a complex reality, partially, and in a way that is heavily weighted in favour of what the accountant is *able* to measure and *chooses* to measure, through the particular schemes of accounting to be adopted.<sup>2</sup>

But that is by no means the end of the matter, because within the framework of a numerical view of reality, accounting theory and accounting practice have been shaped by other metaphors which offer competing views as to

<sup>2</sup> The idea of objectivity and the choice of accounting measures has, of course, also been sustained by the fact that accounting is designed to serve certain interests. There is an important political dimension to reality construction among accountants that must always be examined in providing explanations of the history of the profession. My aim in this article is to focus on epistemological aspects of the problem; i.e. my paper is framed and limited by the metaphor “accounting as reality construction”, rather than “accounting as power”, “accounting as domination”, etc.

*how* numerical reality should be represented and understood (Davis *et al.*, 1982). Accounting as a discipline has constructed and changed its identity over the years, in a manner that provides a close parallel with that found in organization theory. Just as organization theory has been developed and enriched by viewing organizations as machines, organisms, cybernetic brains, cultures, political systems, instruments of domination, and so on, accounting theory has been shaped and formed by metaphorical interpretations that encourage accountants to construct and interpret the significance and merit of different accounting schemes from all kinds of vantage points.

For example, here is a list of some of the major metaphors that have exerted an impact on recent accounting theory:

*Accounting as history:* the view that accounting is concerned with providing a faithful record of the transactions of an enterprise, and with reporting such transactions in a manner suited to the needs of users (e.g. Paton & Littleton, 1940; Littleton, 1953).

*Accounting as economics:* the view that accounting should try to mirror current economic realities and reflect basic economic principles (see, for example, Davis *et al.*, 1982).

*Accounting as information:* the view that accounting should form part of a wider MIS framework (e.g. Prakash & Rappaport, 1977; Snowball, 1980).

*Accounting as a language:* the view that accounting provides concepts and frameworks which structure thought, conversation, perceptions and decision-making (e.g. Belkaoui, 1978), especially to support capitalism.

*Accounting as rhetoric:* the view that accounting, and the debate about different accounting systems, is largely a question of argument and discourse where various proponents attempt to convince others of the superiority of one principle over another (e.g. Arrington, 1987).

*Accounting as politics:* the view that accounting and accounting systems reflect and support the values and needs of specific interest groups, and that accounting information is constructed and used as a resource in shaping corporate politics, especially in decision-making and impression management (e.g. Burchell *et al.*, 1980).

*Accounting as mythology:* the view that accounting systems provide a societal resource to be used in sustaining myths of rationality, and as a means of justifying, rationalizing and legitimizing decisions that ultimately serve other individual and social ends (e.g. Boland, 1982).

*Accounting as magic:* the view that underneath the veneer of rationality, accounting and the use of accounting

information forms part of a societal "rite" serving the same functions for modern decision-makers as the entrails of chickens served for old witch doctors (e.g. Gambling, 1977).

*Accounting as disciplined control:* the view that one of the primary functions of accounting is to exercise surveillance by creating "visibility": just as prisons are often designed to maximize the visibility and scrutiny of inmates, accounting systems are often designed to increase the visibility and scrutiny exercised over employees, even those working in remote locations without direct forms of supervision (e.g. Burchell *et al.*, 1980).

*Accounting as ideology:* the view that accounting systems form part of the ideological apparatus that sustains the ability of a society to produce and reproduce itself in accordance with clearly defined principles. (e.g. Merino & Neimark, 1982; Tinker *et al.*, 1982).

*Accounting as domination and exploitation:* the view that accounting provides techniques for the extraction of wealth in support of elite interest groups, both at the expense of Mother Nature (in terms of natural resources and the ecological balance of the planet), and of the people employed in the service of others (e.g. Tinker, 1985).

All these metaphors have been developed to form competing interpretations regarding the nature and significance of accounting, and how accounting principles can or should be developed. Interestingly, they all grasp significant elements of what accounting is all about, and often suggest interesting principles for accounting design. However, no one metaphor grasps the total nature of accounting as a social phenomenon, for accounting, like other aspects of social life, is inherently complex, multi-dimensional and paradoxical. The accountant and accounting theorist stands in exactly the same relationship to the reality he or she wishes to represent as does the artist, organization theorist or any other person wishing to understand some complex aspect of the world around us. In recognizing this, accountants can move towards a new epistemology for understanding and conducting their craft.

## ACCOUNTING AND THE MYTH OF OBJECTIVITY

Historically, the belief has developed that accounting is grounded in a quest for objectivity

and, by implication, that it is possible for accountants to be objective and to present the reality of a situation in a "true" manner. Clearly, this is an impossible ideal, for, as shown above, accountants are able to do no more than grasp limited aspects of the reality to which their accounting schemes relate. Accounting can never be truly objective, for, as George Berkeley observed in the seventeenth century, objectivity is always as much a part of the observer as of the object observed. Accountants are linked to their observations through accounting principles and practices that are ultimately based on metaphors creating partial and one-sided ways of viewing the world.

The myth of objectivity disguises the true nature of accounting and creates many operational problems because, as every *practising* accountant knows, it is pretty well impossible to defend one's objectivity under close attack from people who have a detailed knowledge of the situations to which the accountant's statements relate. In actual practice, many people know that the accountant's work is based on somewhat arbitrary assumptions and conventions. They know that the accountant is really in the business of trying to persuade others that his or her concepts, or latest set of figures, "give a true and fair view" or have superior insight, when in reality this view, whatever the figures might say, is as partial as any other. The accountant's view of reality often carries more weight than other views, because of the power relations associated with the allocation and control of scarce resources. But this should in no way be seen as due to the accountant's "objectivity".

#### ACCOUNTING AS AN INTERPRETIVE ART

The only viable long-term solution to this problem rests in recognizing and accepting the basic subjectivity of accounting, and in developing a code of practice that will allow the accountant to recognize that he or she is not an "objective commentator", but a person engaged in a complex web of reality construction. The accountant represents complex situations, such as

the economic vitality of an enterprise, the benefits of a particular investment decision or the operational effectiveness of a production system, in limited and rather one-sided ways. But these representations become part of the fabric through which the situation "accounted for" is then sustained or changed. Accountants interpret reality. But their interpretations — in the form of statements about general economic vitality, a capital budget decision, or cost over-run report — became resources in the ongoing construction and reconstruction of reality, as these accounting reports are used to shape or rationalize future decisions.

Four short examples will serve to illustrate how accountants play an active role in this web of reality construction, shaping and sustaining organizational realities through partial ways of seeing.

#### *Accounting and corporate culture*

Accounting systems do more than just monitor or mirror reality; they also shape reality. Consider, for example, how the introduction of rigorous financial controls can reshape the culture and general orientation of an organization. For example, in hospitals introducing systems that make patients or departments profit or cost centres, nurses and other staff often end up as extensions of the new financial systems, recording and allocating their time and use of materials much more rigorously than under more traditional systems of management (Davis, 1986). In the process, the nurses' relations with patients on the one hand and doctors on the other, change, as an orientation to control costs, or "stay within budget", intrudes on decisions that used to be dominated by considerations of health care. The process seems to be particularly evident in relation to the more qualitative aspects of nursing, especially in nonlife-threatening situations. Under the requirement of "meeting budget" the whole work orientation of nursing staff can change towards an administrative rather than patient-oriented focus.

Financial controls can make hospitals more efficient. But they can also make them less humane. Accounting systems grasp and shape

important aspects of the reality of running a hospital, especially the economic and financial aspects, but in the process, they also change the nature and quality of other aspects.

#### *Accounting and technological change*

Most organizations now require that capital expenditures in new technology be subjected to some kind of rigorous financial appraisal. These appraisals might often do an excellent job in determining the financial and economic viability of a proposal, but leave other aspects, such as the general social and human consequences, and even the wider strategic impact, unaddressed. As a result, decision-making is often conducted in a way that promotes "cost consciousness", at the expense of a broader understanding of the implications of a proposed technological change. The existence of techniques and data for evaluating projects in a uni-dimensional way tends to encourage uni-dimensional decision-making. Again, we have an example of how accounting practices that grasp an aspect of "the reality" of organizational decision-making, can have a disturbing influence on others.

#### *Accounting and economic and social policy*

In the 1984–85 coal miners strike in the U.K. accounting practices and related cost and other financial data were used to arrive at National Coal Board (NCB) calculations as to what constitutes an economic coal-mine, with a view to rationalizing which mines should remain open, and which should be closed. The calculations were based on many detailed accounting conventions, on assumptions with regard to the price of coal, and on assumptions that it was legitimate to conceptualize and restrict the economics of pit closure to costs and revenues directly associated with NCB operations (see Berry *et al.*, 1985). There were alternatives to the accounting principles selected to calculate profitability. The price of coal used to estimate future revenues assumed social and political decisions that would result in nuclear energy providing the primary source of future power. Also, the costs of unemployment benefits arising from closure of selected mines, which would have

fallen on the British Government rather than directly on the NCB, were excluded from the calculations, even though the British Government, the ultimate paymaster for the NCB, ultimately had to foot the bill — whether in the form of wages or unemployment benefits.

The point is that the decision regarding what constitutes an economic pit is underpinned by many social and political choices, and that the accounting and economic principles used in actual decision-making captured but a small aspect of the wider socio-political decisions being faced.

#### *Accounting and the "shareholder view" of organization*

Much accounting practice is geared to providing and sustaining a shareholder view of organization, but in recent years, the idea of viewing organizations from a "stakeholder perspective" has grown in importance. Increasingly, organizations are becoming viewed as being as much the property and concern of employees, customers, managers and the general public, as they are of "owners", in the sense that each of these groups has a deep stake, whether for better or worse, in the existence of an organization. Those who provide capital may legally own an organization, but employees and managers invest their working lives, careers, creativity, energy and initiative. Customers may be vitally dependent on the quality of the organization's products for their continued well-being. The public at large also has a stake in ensuring that the organization is a good citizen, and does not pollute the environment or engage in other socially irresponsible practices.

Accountants typically work with the interests of just one or two of these stakeholder groups in mind, even though the health and well-being of the organization may ultimately demand a broader view.

### IMPLICATIONS AND CONCLUSION

The point about these four examples of accounting in practice is that they all illustrate: (a)

the perspective-based nature of accounting; and (b) how accounting is central to the process of reality construction within an organization, shaping decision-making in accordance with the values and perspectives underpinning the accounting principles used.

Accountants are enmeshed in a process of reality construction. They grasp and articulate complex realities in partial ways, and these graspings and articulations help to sustain the realities *as perceived*.

One of the major challenges facing the accounting profession is to come to grips with these essential limitations. Rather than cling to an outdated concept of objectivity, they should confront the basic subjectivity of their craft and develop means of coping with these limitations. In my view, this will lead them to adopt a much more interpretive style of accounting, building on the principles that: (a) accounting is an interpretive art and always perspective-based; and (b) that the challenge facing accountants is to develop forms of practice that emphasize how accounting statements and insights should be regarded and used as elements of a *conversation* or *dialogue*, rather than as foundational claims asserting a particular kind of objectivity or "truth".

A model for developing this interpretive view of accounting is found in Morgan (1986), where the view that effective managers and organizational analysts have to become skilled in the art of "reading" the situations that they are attempting to organize or manage is developed.<sup>3</sup> They have to learn to see and understand the many and paradoxical dimensions of organizations, and find ways of blending them to provide a critical understanding of the multiple meanings and range of possible actions with which they are faced. Skilled managers develop the knack of reading complex situations with various scenarios in mind, and of forging actions appropriate to the understandings obtained.

In a similar way, accountants need to be sensitive to the many dimensions of the realities

which they are attempting to "account for". They need to learn how to probe these dimensions so that multiple insights can emerge, to provide broad-based understandings and platforms for relevant actions. Rather than attempt to represent situations narrowly, through one-sided accounting schemes, they should aim to develop broad-based schemes. But, perhaps most importantly, whatever scheme they use they should always be as sensitive to the elements of reality *excluded* by the scheme, as to those elements that are included. They should realize that in using schemes that highlight certain aspects of organizational reality, they always tend to obliterate other aspects from view.

In essence, this approach requires a reflective and critical understanding of the relationship between the accountant and what is "accounted for", and an ability to discern the hidden or repressed dimensions of a particular set of accounts or approach to the interpretation of those accounts. Accountants have long appreciated the significance of "double-entry" accounting in the production of accounts. What I am advocating here amounts to a kind of "double-view accounting" in the interpretation of accounts. The accountant must recognize the tension that exists between "the world as viewed by the accountant", and "the world in a wider sense".

In recognizing this tension, the accountant will begin to interact and "dialogue" with situations in a much more open-ended interpretive mode, than is the case when they see themselves as producing objective or "true" statements. They will see that their ultimate aim should be to develop the art of "reading" and probing situations to create intelligent, actionable insights, rather than to produce rigid technical statements as ends in themselves. In the process, they will be able to develop an approach to accounting that is able to address many of the problems and tensions that characterize relations between accounting, organizations and society.

<sup>3</sup> A related view is also developed in Morgan (1983), which describes how social science research can develop a "conversational" mode.

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## THE EFFECTS OF AUDIT TECHNOLOGY ON AUDITOR EFFICIENCY: AUDITING AND THE TIMELINESS OF CLIENT EARNINGS ANNOUNCEMENTS\*

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### Abstract

The organizational theory and sociology literatures have long been concerned with the concept of structure, both as a dependent and an independent variable. Relatively recently, auditing researchers have found that public accounting firms differ in the degree of structure their audit technologies exhibit, and that the voting pattern of the Auditing Standards Board appears to be influenced by its members' firm affiliations with respect to their structure orientation. To date, however, the influence of accounting firm structure on client financial reporting characteristics has not been subjected to study.

The purpose of this article is to examine hypothesized relationships between the structure orientation of public accounting firms and client earnings announcement dates, expressed in terms of "early" vs "late". In addition, the impact of the nature of information conveyed, expressed in terms of surprise "good news" or "bad news", is studied. Empirical evidence drawn from the *Wall Street Journal Index*, COMPUSTAT and a prior classification of Big Eight firm audit technologies with respect to structure, suggests that systematic relationships do exist. Implications for future research and audit practice are discussed.

The issue of structure vs judgment in auditing has been receiving increasing attention in the academic literature at both the normative level (e.g. Dirsmith & McAllister, 1982a, b) and the empirical level (e.g. Cushing & Loebbecke, 1986; Kinney, 1986). Simply expressed, the issue concerns whether one can view the attest function as a well-structured, analytical and programmable process, or a process that relies mainly on the auditor's seasoned judgment. For example, Robert Elliott, then Director of Auditing Research at Peat, Marwick, Mitchell & Co. (we will discuss the importance of firm affiliation shortly) has stated that

There are abundant research opportunities in the area of audit efficiency. We need breakthroughs, and in my opinion, there is evidence that breakthroughs are possible. The evidence lies in the recent fruitful attempts to substitute structure for judgment in the audit process (1981, p. 3; see also, Peat, Marwick, Mitchell & Co., 1976).

Similarly, Joyce & Libby (1982) observed that

[A] number of public accounting firms have developed what is known in the judgment literature as "expert measurement and mechanical combination models." These models substitute structure for part of the audit judgment process to ensure that all important variables are evaluated and then combined into a decision in a consistent fashion (p. 110; see also Holstrum, 1980, formerly Director of Audit Research at Deloitte, Haskins & Sells; Willingham, 1987, Director of Audit Research at Peat, Marwick, Mitchell & Co.).

Few would contest the trend towards well-structured, analytical or programmed decision-making in auditing. For example, as Kenneth Stringer (formerly Director of Accounting and Auditing at Deloitte, Haskins & Sells), wrote,

As to auditing procedures and techniques, I believe there is a slow but steady progress towards (1) more structured approaches in the development and application of audit programs, questionnaires, flowcharts, and other

\*We are grateful to Jane Mutchler and our two anonymous reviewers for their useful suggestions.

means for conveying audit instructions and documenting and evaluating information obtained, and (2) the use of quantitative methods for performing and evaluating the results of substantive audit tests. In this respect, future research could be directed to the existence or desirability of this perceived trend (p. 4; see also Loebbecke, 1981, formerly Director of Audit Research at Touche Ross; Mularkey of Touche Ross, 1984; Touche Ross, 1981).

The reasoning underlying the structure orientation is straightforward. Simply expressed, and drawing on a reviewer's observation concerning an earlier version of this manuscript,

... Complexity motivates bureaucracy in the sense that individuals have a more difficult time managing tasks as things become more complex, and structure is provided to help them [cope] with those tasks. An example would be that as accounting rules became more complex, many firms required their auditors to fill out a report preparation checklist as part of every audit.

Taking a judgmental stance, Sullivan (1984), Director of Audit Policy at Coopers & Lybrand and currently Chairman of the Auditing Standards Board, observed that

Those potential policies that underlie a structured audit approach seem to suggest that the issue really isn't that of a structured approach versus an unstructured approach, but rather that of structure versus judgment. The two camps can be divided into those auditors who believe that auditor judgment should be replaced by structured, quantitative algorithms and those who believe that the audit decision-making process cannot be reduced to a quantitative model but will always require the exercise of considerable judgment (1984, p. 62).

Despite the existence of such perhaps diametrically opposed positions, relatively little empirical research exists in general, and less still concerning the issue's impact on financial reporting. This article fills this gap by examining the differential impact of audit firm technology on the timeliness of a client's earnings announcements.

The following discussion is organized into three sections. The first section sets the issue of structure judgment against the backdrop of more broadly discussed concepts in the literature of organizational theory and sociology. This section also describes the relevant prior literature in auditing and derives the principal hypotheses to be empirically tested. The second section describes the research methods the authors employed. The third and fourth sections

describe the data analysis and results, respectively. The final section discusses implications for future research and audit practice.

## STRUCTURE VS JUDGMENT IN CONTEMPORARY ORGANIZATIONS

Organizational theorists have long discussed the concept of "structure." Hickson (1966), for example, referred to the tendency of organizations to utilize structure to gain efficiency through processes described by such adjectives as "bureaucratic," "mechanistic," "closed," "formalized," "routinized," "specific," "well-defined" "programmed," "structured," "scientific" and "rational". Mintzberg (1979) characterized organizations adopting such a design parameter as: striving to ensure machine-like consistency in the work performed by various individuals or subunits; emphasizing production efficiency and precision; encouraging uniform treatment of all problems or clients; and stressing orderliness. Often characterized as emphasizing "knowing it faster, knowing more and knowing it better," the structured or mechanistic action strategy involves (1) strictly and rationally defining both organizational and work process goals and activities performed by members to achieve these goals; (2) developing highly structured and predominantly vertical channels of communication; (3) developing highly formalized decision making processes; and (4) developing highly formalized authority structures (Burns & Stalker, 1961; Mintzberg, 1979). Mintzberg concluded that such a structure-oriented, mechanistic approach tends to perform well in stable contexts that accommodate prespecified task protocols linking the worker with the work performed. Importantly, such an approach invests considerable discretion in those who design the tasks to be performed by others, who should, in turn, seek to maximize conformity with and efficiency of standard operating procedures.

At the opposite end of Hickson's (1966) continuum, one finds the organic metaphor applied (Burns & Stalker, 1961; Mintzberg, 1979). In such contexts, managers address the uncer-

tainty, ambiguity and change their organization faces by pushing decision-making discretion down upon those members who are most sensitive and responsive to problems posed by the environment, and who are mutually connected to and dependent on both one another and a larger social context. Such an action strategy is characterized by (1) situation-specific decisions shaped by context and the expertise of the individual rather than by standard operating procedures; (2) autonomy of individuals where discretion is exercised by those doing the work as opposed to those designing the work specifications; (3) omni-directional flows of information; (4) an emphasis on individual responsibility; (5) situational as opposed to formal authority structures; (6) communications that consist of information and advice rather than instructions and decisions; and (7) a reliance on individual judgment. Within the judgmental or organic approach and in contrast with the structured approach that programs the task, the emphasis here focuses on programming the individual through a socialization process (Inzerilli & Rosen, 1983; Bosk, 1979; Mintzberg, 1979; Larson, 1977; Friedson, 1972). With respect to the reviewer's observation noted earlier, the position here is that the organic organization takes a loosely coupled (Weick, 1976) approach to handling complex problems, wherein they are pushed down and out to those members who are most familiar with the context; to use Weick's metaphor, the mental set behind this approach is that sand is more able to reflect wind currents than are boulders. Similarly, according to Ashby's Law of Requisite Variety (in accounting, see Hedberg & Jonsson, 1978), only varietous, complex coping behaviors can understand or control complex problems. The organic approach addresses problems, not by overlaying a simplifying structure, but by addressing them with tailored solutions.

Importantly, both the structured-mechanistic and the judgmental-organic approaches aim to achieve the same end: regularizing and making predictable the performance of members within the organization. What differs is the means of accomplishing this end.

As it concerns the professions, sociologists have also addressed the issue of structure and judgment. For example, Hall (1972) observed that

As the level of professionalization of employees increases, the level of formalization decreases. The presence of professionals appears to cause a diminished need for formalized rules and procedures. Since professionals have internalized norms and standards, the imposition of organizational requirements is not only unnecessary, it is likely to lead to professional-organizational conflict (p. 121).

On this same point, Larson (1977; see also Friedson, 1972) stressed that in the professions, the "technicality-indeterminancy" ratio of practitioner activities tends to be low. That is, the ability to specify objectively and *a priori* what a professional does is low relative to the importance of subjectively evaluating a context and then taking action.

In some contrast to this perspective, however, Meyer & Rowan (1977) reasoned that many structural properties of organizations arise as a consequence of societal expectations rather than of efforts within the organization to make operations more technically efficient, especially for institutionalized organizations like the professions. On this point, they concluded that

In modern societies, the elements of rationalized formal structure are deeply ingrained in, and reflect, widespread understandings of social reality. Many of the positions, policies, programs and procedures of modern organizations are enforced by public opinion, by the views of important constituents, by knowledge legitimated through the educational system, by social prestige, by the laws, and by the definitions of negligence and prudence used by the courts. Such elements of formal structure are manifestations of powerful institutional rules which function as highly rationalized myths that are binding on particular organizations (pp. 343-344).

Similarly, DiMaggio & Powell (1983) sought to understand the processes underlying the tendency for organizations to become alike with respect to their bureaucratic characteristics, and they noted that

[S]tructural change in organizations seems less and less driven by competition or by the need for efficiency. Instead, bureaucratization and other forms of organizational change occur as the result of processes that make organizations more similar without necessarily making

them more efficient. Bureaucratization and other forms of homogenization emerge, we argue, out of the "structuration" of organizational fields. This process, in turn, is effected largely by the state and the professions, which have become the great rationalizers of the second half of the twentieth century [H]ighly structured organizational fields provide a context in which individual efforts to deal rationally with uncertainty and constraint often lead, in the aggregate, to homogeneity in structure, culture and output (p. 147).

They concluded that three forces contribute to this homogenization of structure: (1) the rise of professional and academic associations that create normative prescriptions of what practice ought to be like so that the associations can gain professional or scientific recognition and a concomitant autonomy; (2) a perceived need of organizations to be similar to peer organizations in many demonstrable ways in order to be seen as legitimate by external constituents; and (3) the need to conform to formal rules and regulations imposed by government and professional associations.

Mintzberg (1979) sought to understand the often conflicting pressures exerted to be "judgmentally-oriented" as opposed to "structurally-oriented" as these terms relate to the professions. Rather than use the words "structure" and "judgment," *per se*, Mintzberg discussed two organizational forms: (1) the machine bureaucracy (or organizations he characterized as being highly specialized, requiring routinized operating tasks and standardized procedures in the operating core, wielding relatively centralized power in the sense that decision discretion resides with the task designers, employing formalized communications patterns, and relying on a functional basis for grouping tasks), and (2) the professional bureaucracy (or organizations comprised of professionals who, to achieve coordination, rely on the standardized skills among their members gained through training and socialization where individual practitioners have considerable control over their own work). Mintzberg reasoned that rather than expecting to observe pure types, one could assume that actual organizations differ as they are differentially influenced by various forces pushing and pulling them towards each end of a con-

tinuum bordered by these two organizational forms. He saw organizations being drawn to a machine bureaucracy form of organization by (a) the pull of technical considerations to standardize activities so as to achieve production efficiency and minimize the time spent on achieving objectives; (b) the need to display for external constituents a commitment to rationality so as to gain legitimacy; and (c) the need to conform to externally imposed rules and regulations. By contrast, organizations lean toward the professional bureaucracy form of organization when they (a) have complex and ambiguous goals; (b) tend to deal with complex problems on a case-by-case basis; and (c) the members prefer to exercise professional autonomy. Thus, one is unlikely to achieve an absolute structure or judgment orientation; rather, concentration is placed on achieving some sense of balance, albeit a temporary one, among a host of competing forces.

Within the accounting literature, the issue of structure vs judgment as such has received only slight and relatively recent attention. From a normative perspective, Dirsmith & McAllister (1982a, b; see also Dirsmith *et al.*, 1985) traced a growing recognition of the central role of professional judgment in auditing since the turn of the twentieth century. Here, the audit was seen as being contingent upon such client-centered factors as the purpose of the audit, the extent of detail to be reported upon, the nature of the client's business, the organization's size, the competence and training of its personnel and the quality of its internal control system (see also, Sullivan of Coopers & Lybrand, 1984; Defliese *et al.*, 1975). Arrayed against this force pushing the audit toward judgment — a force they termed "organicism" — Dirsmith & McAllister discussed such countervailing forces as the need to document the audit comprehensively, as influenced by peer review, the threat of lawsuits, growing competition in the auditing profession that increases a need for efficiency, and high staff turnover. They reasoned that these forces presage a reliance on standard operating procedures, routinized decision making, and documentable and analytical, or "mechanistic" decision-mak-

ing. Dirsmith & McAllister concluded that auditing is becoming increasingly structured in contemporary practice and prescribed further research into the implications of this trend.

The empirical study conducted by Cushing & Loebbecke (1986) attempted an understanding of auditing by examining the way in which it is actually practiced. Toward this end, they subjected the in-house audit manuals of 12 large public accounting firms to a form of content analysis, categorizing the manuals according to (1) the length of the material; (2) the types of material, including narratives, checklists, pre-printed forms, questionnaires, formulae, computer programs, flowcharts, matrices and diagnostic techniques; (3) a judgment as to whether the materials were primarily qualitative or analytical in nature; and (4) an evaluation of the degree of integration of the materials. Importantly for purposes of the current study, but apparently unanticipated, Cushing & Loebbecke found that the firms varied quite dramatically one from another in terms of how structured their audit technologies were. Categorizing the firms as highly structured, semi-structured, partially structured and unstructured, Cushing & Loebbecke described highly structured firms as placing strong emphasis on pre-engagement planning, the explicit definition of staffing responsibilities for each audit, a reliance on specialists, the quantification of audit risk and conformity during each audit with detailed or comprehensive guidance, and a shift of audit decision making from the individual auditor toward the central firm. By contrast, unstructured firms emphasized pre-engagement planning and the use of detailed internal control questionnaires, but the remainder of the audit process was not described in a detailed, integrated, quantitative manner.

Cushing & Loebbecke concluded their analysis by discussing the advantages and disadvantages of structure in view of a number of forces that included [where (+) indicates forces favoring structure and (-) indicated that it mitigates against structure]: greater competition and the resulting emphasis on audit efficiency (+); greater regulation of the profession (+); audit litigation

and the need to demonstrate what the audit entailed (+); increased use of computers (+); the increasing complexity of the business environment (+) (note that this is consistent with the reviewer's observation noted earlier and contrasts with Mintzberg, 1979); the existence of clients with unique problems (-); a possible tendency of some individual auditors to apply structured materials in a mechanistic way (-); the possibility that firm members may not totally follow prescribed structured steps in an audit involving litigation (-); and a perception that a structured approach reduces opportunities to apply professional judgment (-). Cushing & Loebbecke recommended future research directed at identifying the differences among firms that vary in terms of structure. At a macro level, they more specifically recommended research into (a) whether or not a structured approach does in fact improve audit efficiency, and (b) the corollary question of whether or not it is better suited for routine, typical audits.

In a second empirical study, Kinney (1986) analyzed the voting patterns of the Auditing Standards Board. From a positive theory perspective, Kinney first asked the Board members to classify the firms they represented with regard to how structured or unstructured their audit approaches were. Kinney used this evidence to classify the firms as follows:

(1) Structured — Deloitte, Haskins & Sells (DH&S); Peat, Marwick, Mitchell & Co. (PMM); Touche Ross (TR); and two smaller firms.

(2) Intermediate — Arthur Andersen (AA); Arthur Young (AY); Ernst & Whinney (E&W); two non-Big Eight firms; and one small firm.

(3) Unstructured — Coopers & Lybrand (C&L); Price Waterhouse (PW); and nine small firms.

After corroborating these observations with other sources of information, including the 1986 Cushing & Loebbecke study, Kinney tabulated the Board's ballots for the three-year period ending in 1984. He found that firms with relatively structured audit technologies tended to favor proposals that included relatively technical standards which added structured guidance; relatively unstructured firms did not. In addition,

he noted a tendency for the overall Board to vote in favor of structured standards. In conclusion, Kinney recommended future research directed at studying auditor's behavior with respect to the degree of structure imposed by their firm; one such behavior prescribed by Kinney was communicating with external users.

Thus, the extant auditing literature has identified the issue of structure vs judgment as an important research concern. So far, the empirical research indicates (1) that large CPA firms differ significantly in terms of the structure they impose upon their audit processes, and (2) that the issue of structure vs judgment influences the development of auditing standards (Kinney, 1986). An unresolved issue concerns the impact of audit structure-judgment on the main product of these auditing standards and processes: audited financial statements.

#### *Recapitulation and hypotheses*

To summarize, the consistency within the existing auditing and organizational theory literatures is compelling with respect to both the nature of the discussion of structure and judgment and the various forces continually pushing and pulling organizational and audit practice towards and away from a structured or judgmental orientation. Figure 1 portrays these relationships.

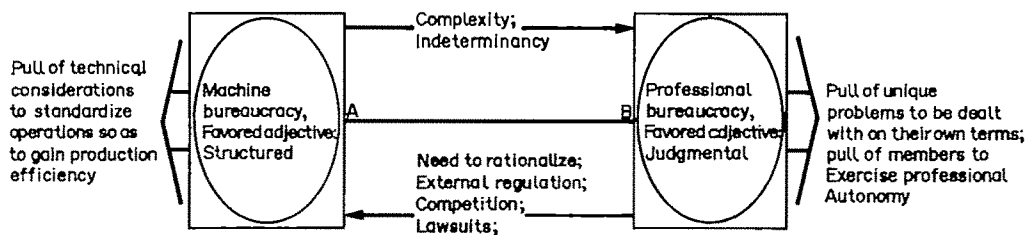


Fig. 1. Organizational forms and internal structural properties. (Derived from Mintzberg, 1979; Dirsmith & McAllister, 1982a, b; Cushing & Loebbecke, 1986.)

With reference to the continuum A-B in Fig. 1 and consistent with Mintzberg (1979), it is improbable that all CPA firms be identical with regard to this structure-judgment dichotomy, a supposition supported by the empirical work of Cushing & Loebbecke (1986) and Kinney (1986). It would seem likely, therefore, that the

various firms would have responded to the various forces at work in different ways.

From among the potential forces, or independent variables discussed and portrayed in Fig. 1, two seem to be particularly relevant to the study reported here: (1) the pull of a technical orientation to standardize operations and gain efficiency and (2) the pull of problems to be dealt with uniquely on their own terms. As discussed primarily in the organizational theory literature (notably by Mintzberg, 1979), the pull of a technical orientation to gain production efficiency is closely associated with a structure-oriented approach to organizational practice. One manifestation of this orientation is a focus on time — that is, a need to perform tasks as quickly and efficiently as possible. In relatively structured auditing firms, this orientation translates readily into completing the audit as quickly as possible. In support of this point, Cushing & Loebbecke (1986, see, in particular, pp. 41–42) reason that CPA firms often strive to perform more efficient audits by applying a structured approach.

By contrast, a tendency to deal with problems on a case-by-case basis is closely associated with a judgment orientation. One manifestation of this orientation is to focus on a problem and a willingness to explore its various unique characteristics more or less irrespective of the time it takes. In judgmental auditing firms, the orienta-

tion may encourage auditors to take more time to deal with unanticipated financial reporting problems. In support of this point, Cushing & Loebbecke (1986, especially at pp. 43–44) reason that inflexibility in the structured approach may make it less applicable in an atypical environment; by implication and by contrast, a

judgmental approach can be tailored to unique problems.

Based on this reasoning and as depicted in Fig. 2, it is possible to advance a compound hypothesis that we have organized as two hypotheses to facilitate testing and discussions:

$H_1$ . Structure-oriented auditing firms complete audits on a more timely basis irrespective of the audit difficulties they encounter than more judgmentally oriented firms.

$H_2$ . Judgmentally oriented auditing firms complete audits more slowly when they involve unanticipated financial reporting problems than more structure-oriented firms.

worth noting, this position belies the reasoning of Meyer & Rowan (1977), Mintzberg (1979) and DiMaggio & Powell (1983), who held that many aspects of organizational structure are influenced more by societal expectations of what constitutes legitimate organizational practice than the technical considerations of the tasks at hand. Thus, judgmentally-oriented firms may be expected to exercise judgment on audits in fact, while having to keep up appearances as to the structure dimensions of audits, thereby losing ef-

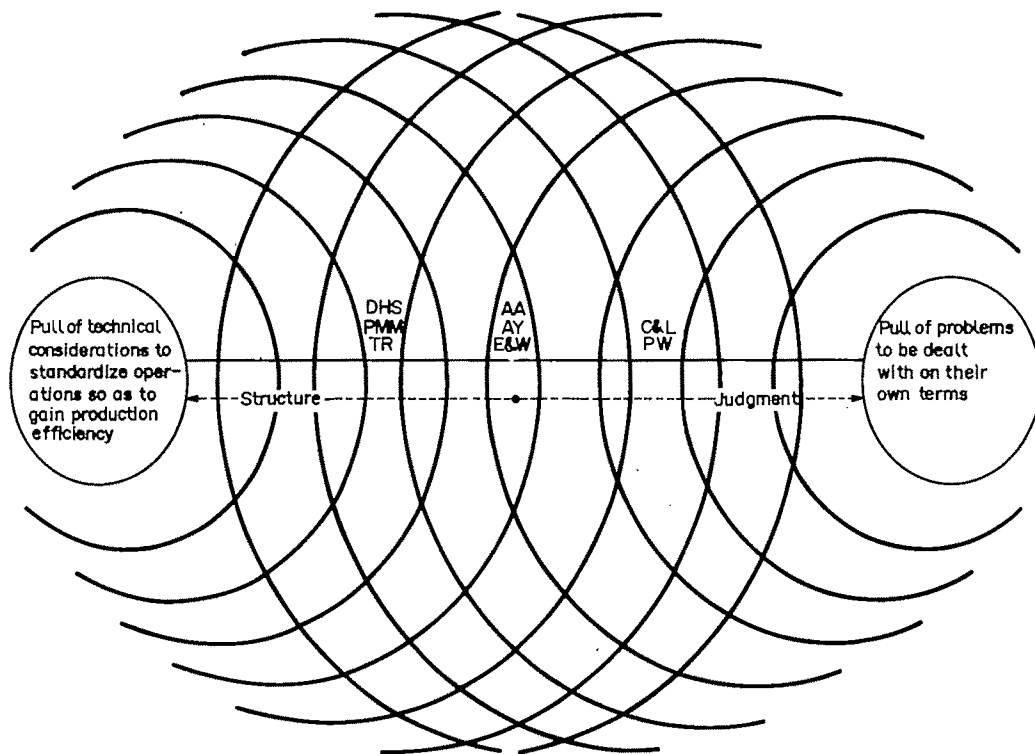


Fig. 2. Structure vs judgment: zones of influence.

In marked contrast with hypothesis  $H_2$ , a competing view reflective of a more technical orientation may be advanced. Here, it may be argued that since judgmentally-oriented firms are not encumbered by form and overly demanding methods, they can address problem areas directly and deal with them in the most effective manner given the circumstances, thereby being more efficient than structured firms. While

As portrayed in Fig. 1 and consistent with the theoretical positions discussed in this section, such firms are indeed influenced by the need for efficiency, but are more differentially influenced by unique problem areas to be dealt with on their own terms and the desire for professional autonomy than are structure-oriented firms. Obviously, though, this issue remains open for future research.

## RESEARCH METHODS

This section describes the data collection and analysis methods used to test hypotheses  $H_1$  and  $H_2$ . The discussion is organized into dependent and independent variable subsections, and Table 1 presents the research model employed in terms of theoretical constructs, operational definitions and operational measures.

*The dependent variable*

As hypotheses  $H_1$  and  $H_2$  suggest, this research focused on the efficiency with which a firm completes an audit. There are, of course, many diffe-

rent ways to measure efficiency, one of which uses the concept of time. On this point, Statement of Auditing Standard No. 48, paragraph 77, states that "efficiency refers to the audit time and effort required to perform the procedures." This definition was employed in this study.

One surrogate measure of auditor efficiency is the speed with which an auditor completes an engagement. Ashton *et al.* (1986) identified several factors that may influence the completion of an audit: the quality of the client's accounting records, the inherent nature of the accounts, client pressure concerning the earnings release date, the amount of interim vs

TABLE 1. Research model

|                         | Dependent variable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Independent variable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Theoretical construct   | The timeliness with which the audit is completed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | The relative degree of structure vs judgment reflected in an audit firm's audit process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Operational definitions | Earnings announcement dates, expressed in terms of whether they are early or late, and as conditioned by whether earnings are characterized as unexpectedly good or bad news, and whether the financial statements received an unqualified or qualified audit opinion.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Perceptions as to the structure-judgment of auditing firms audit processes as judged by members of the Auditing Standards Board.                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Operational measures    | The difference between average earnings announcement dates from 1980 to 1983 and the 1984 earnings announcement date as disclosed in the <i>Wall Street Journal Index</i> , (depicted as $\Delta$ Date in tables) as conditioned by the difference between the estimated 1984 earnings figure disclosed in Value Line Investment Services in 1984, and reported actual earnings as disclosed in the expanded 1984 COMPUSTAT data tape (above expected, expected, below expected), the binary variable of unqualified or qualified audit opinion as also disclosed in the expanded 1984 COMPUSTAT data tape (qualified = 1, unqualified = 0). Intervening variables controlled for include size (the natural log of net sales for 1984) and industry as revealed by each company's two digit SIC Code (MANUFACTURING). | Classification of Big Eight firms constructed by Kinney (1986) <i>Structured</i> (TECH 3): Deloitte, Haskins, & Sells (DHS), Peat, Marwick, Mitchell (PMM), Touche Ross (TR); <i>Intermediate</i> (TECH 2): Arthur Anderson (AA), Arthur Young (AY), Ernest & Whinney (E&W); <i>Judgmental</i> (TECH 1): Coopers & Lybrand (CL), Price Waterhouse (PW). This classification scheme was corroborated by Kinney with other sources of evidence (1986, p. 83; see also Cushing & Loebbecke, 1986).<br><br>Information on company auditors was obtained from <i>Who Audits America</i> . |



year-end work, and the quality of the audit staff (Ashton *et al.*, 1986). Beyond these, other possible factors include: the amount of resources available to meet client demands for a particular report date, the degree of problems that the CPA firm encounters and the overall quality of the audit examination. An important issue affecting the applicability of these factors in research is their public availability. Such constraints as client confidentiality obviously make it impossible to solicit certain components of this information (for example, client pressure) directly from auditors. Moreover, indirect, self-reported measures of other factors (for example, staff quality) would probably be biased in terms of instrumentation effects. As a surrogate, the authors used the earnings announcement dates of actual companies to indicate the relative timeliness of an audit's completion. This measure is not without its problems.

Several previous empirical studies have addressed the timeliness of earnings announcements. Dyer & McHugh (1975), Curtis (1976), Davies & Whittred (1980) and Whittred (1980), for example, all examined the reporting behavior of Commonwealth companies, concluding that first-time audit qualifications and significant changes in return on equity (ROE) revealed in financial statements delayed the annual earnings announcements. On this issue of the timeliness of earnings announcements and profitability, these studies produced conflicting results. Dyer & McHugh (1975) and Davies & Whittred (1980) found that very profitable (an ROE over 25%) and unprofitable (a negative ROE) firm experienced early and late reporting behavior, respectively. Curtis (1976) found conflicting results based upon the measure of profitability selected.

In the more recent studies, the difference between expected and actual earnings replaced profitability as the main explanatory variable. For instance, empirical evidence suggests that profitability ratios may not be the primary motivation behind a manager's desire to report early or late. Kross (1982), Givoly & Palmon (1982), Kross & Schroeder (1984) and Chambers & Penman (1984) studied whether firms reported

"good news" early and "bad news" late. Examining 130 companies reporting good or bad news during the period between 1971 and 1975, Kross (1982) determined that late earnings announcements have a higher probability of containing bad news than do early announcements. In this study, "good news" and "bad news" were operationally defined as actual earnings per share (EPS) being higher or lower, respectively, than the expected EPS reported in the Value Line Investment Survey. Also, Kross used a four-year moving average to determine the expected earnings date, and then classified a firm as an "early" or "late" reporter of earnings if the actual date proved to be prior or subsequent to the average, respectively.

Givoly & Palmon (1982) examined 130 industrial companies over a 15-year test period ending in 1974. Using the Standard and Poor's Earnings Forecaster as the benchmark for expected EPS, they defined "good news" and "bad news" as the three best and three worst EPS announcements during the test period. They also classified their companies as early or late disclosers of earnings announcements based upon the average disclosure dates of prior years reported in the *Wall Street Journal Index (WSJI)*. Givoly and Palmon's results were not overly persuasive, but they did reveal that both bad news and good news are sometimes delayed. In addition, they also discovered that company size (as defined by the size of sales) is inversely related to reporting delays.

Kross & Schroeder (1984) analyzed 297 New York and American Stock Exchange companies with a 31 December year-end date for the period 1977–1980. For each company, they computed a predicted date for quarterly earnings announcement and then subtracted the actual date of the announcement to produce a measure of unexpected delay. This unexpected delay measure was then correlated with the type of earnings announcement (good news or bad news). The results suggested that companies with good news announced earnings earlier than their expected reporting date, whereas companies with bad news announced earnings later than the expected reporting date. Importantly for purposes

of the current discussion, the explanation for these findings was that bad news releases were associated with audit delays.

Finally, Chambers & Penman (1984) randomly selected 100 New York Stock Exchange companies that had reported earnings announcements in the *WSJI* over the seven-year period from 1970 to 1976. They based the expected announcement date upon the average of prior years, and they classified good news and bad news announcements on the basis of the observed stock market return for the company over the two-day reporting period. The results showed an inverse relationship between company size (as measured by its market value) and reporting lags. They also discovered that "unexpectedly early reports are characterized by good news, whereas unexpectedly late reports tend to bear bad news." These four recent studies suggest that the type of earnings (good or bad news) and possibly the size of the company influence announcement dates.

Specifically as they concern the current study, the timeliness of earnings announcements (early vs late) and the type of earnings announcements (good vs bad news) appear to be germane. Regarding hypothesis  $H_1$ , it seems reasonable to propose that auditors for companies experiencing unexpectedly strong earnings may stress audit efficiency more insistently than auditors for companies expecting normal earnings and especially companies expecting low earnings. Thus, for example, an early earnings announcement date would suggest the quick completion of an audit.

By contrast, regarding  $H_2$ , it seems reasonable to propose that companies experiencing low earnings also experience problems pertaining to these earnings sufficient to attract increased audit attention, in turn requiring more audit testing and thus contributing to a delayed earnings announcement date. On this point, and consistent with Whittred (1980) who found that first time audit qualifications are associated with delayed earnings announcements, the effect of audit qualifications is an additional factor that is worthy of consideration and is therefore included in the current research design.

Companies were selected for inclusion in the sample if they conformed to the following five criteria:

(1) they were listed on the 1984 COMPUSTAT data tape;

(2) they had disclosed 1984 estimated EPS figures in the Value Line Investment Services;

(3) they had a fiscal year ending 31 December;

(4) they had announced annual earnings in the *WSJI* during 1980–84; and

(5) they were audited by the same Big Eight firm for the period 1980–84.

The first two selection criteria expedited the data collection process and are consistent with prior research. The COMPUSTAT data tape and Value Line Investment Services monitor the majority of the New York Stock Exchange and American Stock Exchange members and some over-the-counter companies. Value Line EPS forecasts appeared at the end of the third quarter, approximately two months before the actual earnings announcements. (Brown & Rozeff [1978] determined that Value Line forecasts are more accurate than many other statistical or naive models of expected earnings.) The third criterion ensured that all companies were influenced by the same "busy season" audit pressures. The fourth criterion involved use of the *Wall Street Journal* announcement date. Here, Whittred (1980) discovered little difference in earnings announcement dates when he examined these three reporting lags: the number of days from the year end to (1) the disclosure of the preliminary financial statement information in the press; (2) the date on the auditor's report included in the annual report; and (3) the final filing date. Furthermore, the efficient market literature has consistently demonstrated that the market immediately impounds publicly available information. It would appear, then, that a press release signals the first moment when information may be formally conveyed to statement users. Thus, based on the findings of prior research, using *WSJI* as a surrogate measure for the audit completion date appears justified. Finally, the sample was restricted to the Big Eight because they represented 95.2% of the

firms remaining after the first four selection criteria and because of data collection constraints associated with the independent variable measures discussed below.

This sample appears to improve upon prior research studies on the timeliness of earnings announcements because it represents a larger sample (679 companies) and a more current test period (1984), and because it controls for the potential confounding factors of auditor and industry effects discussed in the next subsection. The data gathered or computed for the 679 companies that satisfied the selection criteria used in testing hypothesis included;

- (1) a two-digit Standard Industrial Classification Code (SIC),
- (2) the natural log of net sales for 1984 (SIZE),
- (3) the EPS for 1984 per the COMPUSTAT data tapes (EPS),
- (4) the forecasted 1984 EPS per Value Line Investment Service [E(EPS)],
- (5) the percentage difference between forecast and actual EPS (%),
- (6) the average disclosure date from *WSJ* for 1980 through 1983 (AVER),
- (7) the disclosure date for 1984 in the *WSJ* (DATE-1984),
- (8) the difference between (6) and (7) (ADATE) and
- (9) the presence of a qualified or unqualified audit report.

In order to claim results consistent with those of prior earnings announcement studies, the authors also partitioned the sample of 679 subjects into two subsamples—manufacturing (SIC codes 10–39), and service (SIC codes 40–89)—in order to determine the comparability of the results with the Givoly & Palmon (1982) study that included only industrial firms in its sample.

#### *Independent variable*

The independent variable employed in both hypotheses  $H_1$  and  $H_2$  relates to the relative degree of structure vs judgment of a CPA firm's audit technology. Kinney's (1986) classification scheme was adopted for testing purposes. As discussed in the previous section, Kinney found that individuals who belonged to the Auditing Standards Board voted consistently with their firm's audit technology. Once more, he classified the firm's technologies as follows: DHS, PMM,

and TR were structured firms; CL and PW were unstructured firms; and AA, AY, and EW were intermediate firms. Kinney corroborated this classification scheme in a number of ways. First, he observed a strong interrater reliability in the original classification. Second, he found consistency with Cushing & Loebbecke's (1986) study that had, however, kept the firm names in confidence. Third, he found his classification consistent with the positions the firms themselves or their various members or former members assumed (e.g. Willingham, 1987; Mullarkey, 1984; Sullivan, 1984; Elliott, 1981, 1983; Holstrum & Kirland, 1982; Loebbecke, 1981; Stringer, 1975, 1981; Touche Ross & Co., 1981; Holstrum, 1980; Peat, Marwick, Mitchell & Co., 1976; Defliese *et al.*, 1975; Elliott & Rogers, 1972).

The authors decided to study the earnings announcement dates for only Big Eight clients, rather than for all firms Kinney classified, for two reasons. The first relates to data availability as to Kinney's classifications. For example, he grouped only two Big Eight and nine small firms as "unstructured"; no national but non-Big Eight firms were so classified. Moreover, only three of seven possible national though non-Big Eight firms were classified in Kinney's study. Thus, adopting Kinney's classification *in toto* would have produced an unbalanced, incomplete design. Second, for the period studied, the Big Eight accounted for 95.2% of all companies meeting selection criteria discussed in the previous subsection. Thus, focusing on only Big Eight was considered appropriate for the purposes of testing hypotheses.

Before testing, the authors had to determine whether results might be more a function of such client characteristics as stability-dynamism, (Thompson, 1967) than audit technology. On this point, Hagerman *et al.* (1984) warned, for example, that differences among accounting firms may reflect economic differences among client portfolios more than actual differences among the firms (although we feel that this may be one more dimension that differentiates structured from judgmental firms). A composite volatility score was used to test for a stable vs dynamic client mix among

auditing firms; Bourgeois (1985) was able to measure the degree of dynamism or volatility by computing the coefficient of variation for sales.<sup>1</sup> Table 2 shows the composite volatility scores for the portfolios of each Big Eight firm. Panel A of Table 2, contains the descriptive statistics for all firms appearing on the COMPUSTAT tape that provided complete sales data for 1979–84 and listed in *Who Audits America* (1985); all outliers beyond four standard deviations from the mean were truncated. The 2748 firms that satisfied the selection criteria represent the largest audit clients for each of the Big Eight firms (88.6% of total sales audited, but only 42.3% of total clients audited, as listed in the 1984 edition of *Who Audits America*).

The authors conducted tests for significant differences among audit technologies and among companies on the mean volatility scores. Panel B of Table 2 shows the probabilities associated with individual equality of means *t*-tests for each of the three audit technologies, while panel C of Table 2, shows the individual *t*-test probabilities organized by auditor. Statistical results indicate that there exist no significant differences among the firms or types of audit technologies.

### DATA ANALYSIS

The sample of companies meeting the selection criteria described earlier were then partitioned by earnings results and audit technology, and classified according to both earnings results and audit opinions received by following the decision rules used in prior studies. The fol-

lowing tricotomization of earnings was employed and represents a refinement over simple "good news" vs "bad news" classifications (see, e.g. Kross, 1982; Givoly & Palmon, 1982):

(1) Above Expected Earnings = [Forecasted EPS – Actual EPS/Forecasted EPS] > 10%.

(2) Expected Earnings = 10% ≥ [Forecasted EPS – Actual EPS/Forecasted EPS] ≥ – 10%.

(3) Below Expected Earnings = [Forecasted EPS – Actual EPS/Forecasted EPS] < – 10%.

The companies were then cross classified into the structure–intermediate–judgment orientation of their auditing firms' audit processes, where CL and PW represented TECH1; AA, AY and EW represented TECH2, and DHS, PMM and TR represented TECH3. Table 3 provides descriptive statistics with respect to means and standard deviations organized by Big Eight firms, by earnings category and by audit technology; for Announcement Date Difference ( $\Delta\text{Date}$ ) in Table 3, minus observations denote earlier than expected announcement dates and plus observations denote later than expected. As can be seen in the 1984 announcement dates, structured firms, on average, tend to be associated with earnings announcements that are released earlier (thus, lending support for hypothesis  $H_1$ ), and that under conditions of adversity, i.e. below expected earnings, judgmental firms, on average, tend to be associated with earnings announcements that are released later (thus lending support to hypothesis  $H_2$ ).

It is important to note both that unstructured firms appear to have a wider range of announcement date changes across earnings categories than do the other types of firms, and that intermediate firms have the narrowest range. As will

<sup>1</sup>The authors used the coefficient of variation of first differences of sales to measure the volatility for each company.

$$\text{Volatility} = \frac{\sqrt{\sum_{j=1}^5 \frac{(X_j - \bar{X})^2}{5}}}{\bar{X}}$$

where  $j$  = year (1980–84)  
 $X_j$  = (sales<sub>*j*</sub> – sales<sub>*j-1*</sub>).

TABLE 2. Aggregate degree of client variability

| A. Descriptive statistics |                   |                      |                    |                    |
|---------------------------|-------------------|----------------------|--------------------|--------------------|
| Firm/audit technology     | Number of clients | Mean 1984 sales(\$)* | Variability score† |                    |
|                           |                   |                      | Mean               | Standard deviation |
| Coopers & Lybrand         | 347               | 1179                 | 0.465              | 5.99               |
| Price Waterhouse          | 355               | 2192                 | 0.577              | 5.75               |
| Total unstructured firms  | 702               | 1691                 | 0.522              | 5.78               |
| Arthur Andersen           | 520               | 912                  | 0.595              | 5.79               |
| Arthur Young              | 221               | 1310                 | 0.887              | 7.35               |
| Ernst & Whinney           | 230               | 1105                 | 0.654              | 6.03               |
| Total intermediate firms  | 971               | 1017                 | 0.675              | 6.23               |
| Deloitte Haskins & Sells  | 398               | 765                  | 0.966              | 6.30               |
| Peat Marwick Mitchell     | 361               | 946                  | 1.162              | 6.19               |
| Touche Ross               | 316               | 793                  | 0.378              | 5.48               |
| Total structured firms    | 1075              | 834                  | 0.859              | 6.06               |
| All firms                 | 2748              | 1118                 | 0.707              | 6.16               |

\*In millions.

†Outliers truncated to four standard deviations beyond the mean.

## B. Probabilities associated with equalities of mean — by audit technology

|              | Unstructured | Intermediate | Structured |
|--------------|--------------|--------------|------------|
| Unstructured | 1.000        | 0.492        | 0.607      |
| Intermediate | —            | 1.000        | 0.254      |
| Structured   | —            | —            | 1.000      |

## C. Probabilities with equalities of means — by Big Eight firms

|     | AA    | AY    | CL    | DHS   | EW    | PMM   | PW    | TR    |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| AA  | 1.000 | 0.544 | 0.759 | 0.364 | 0.903 | 0.177 | 0.965 | 0.620 |
| AY  |       | 1.000 | 0.425 | 0.877 | 0.687 | 0.599 | 0.556 | 0.343 |
| CL  |       |       | 1.000 | 0.261 | 0.717 | 0.131 | 0.809 | 0.856 |
| DHS |       |       |       | 1.000 | 0.539 | 0.661 | 0.384 | 0.203 |
| EW  |       |       |       |       | 1.000 | 0.326 | 0.820 | 0.604 |
| PMM |       |       |       |       |       | 1.000 | 0.202 | 0.097 |
| PW  |       |       |       |       |       |       | 1.000 | 0.676 |
| TR  |       |       |       |       |       |       |       | 1.000 |

be seen, these results are quite consistent with those reported in Table 5. Consistent with our reasoning advanced earlier concerning below expected earning triggering increased audit scrutiny, it is noteworthy that the *ranking* of  $\Delta$ Dates is similar across firms with respect to the three earnings categories.

Table 4 presents a correlation matrix for independent variables. As can be seen, significant

correlations were observed among the three binary variables representing audit technology (as expected since they reflect the same concept). Further, the binary variable MANUFACTURING (coded 1 if the company was a manufacturing client and 0 if it was a service company) was observed to be significantly correlated with AVER (average disclosure date). This observation is consistent with prior expecta-

TABLE 3. Descriptive statistics on announcement dates

| Audit tech.  | Earnings category | Sample size | Mean (S. D.) number of days      |                                          |                                               | 1984 announcement date by earnings category (all 679 firms) |
|--------------|-------------------|-------------|----------------------------------|------------------------------------------|-----------------------------------------------|-------------------------------------------------------------|
|              |                   |             | 1984 announcement date (Date-84) | Average announcement date 1980-83 (AVER) | Announcement date difference ( $\Delta$ Date) |                                                             |
| Unstructured | Above expected    | 28          | 38.1<br>(16.0)                   | 40.5<br>(17.9)                           | -2.4<br>(6.8)                                 | 37.7<br>(15.0)                                              |
|              | Expected          | 101         | 35.4<br>(11.4)                   | 36.6<br>(12.5)                           | -1.2<br>(6.3)                                 | 34.4<br>(13.0)                                              |
|              | Below expected    | 64          | 44.3<br>(20.4)                   | 37.3<br>(10.5)                           | 7.0<br>(6.9)                                  | 42.8<br>(19.5)                                              |
|              | Total unstruc.    | 193         | 38.7<br>(16.3)                   | 37.4<br>(12.9)                           | 1.3<br>(11.8)                                 | 37.8<br>(16.3)                                              |
| Intermediate | Above expected    | 53          | 38.3<br>(15.8)                   | 38.7<br>(15.2)                           | -0.4<br>(7.0)                                 |                                                             |
|              | Expected          | 136         | 35.1<br>(12.8)                   | 35.3<br>(11.7)                           | -0.2<br>(6.7)                                 |                                                             |
|              | Below expected    | 103         | 42.0<br>(18.7)                   | 40.2<br>(15.2)                           | 1.8<br>(10.3)                                 |                                                             |
|              | Total intermed.   | 292         | 38.1<br>(15.9)                   | 37.7<br>(13.8)                           | 0.4<br>(8.2)                                  |                                                             |
| Structured   | Above expected    | 32          | 36.2<br>(12.8)                   | 39.6<br>(14.6)                           | -3.4<br>(8.1)                                 |                                                             |
|              | Expected          | 98          | 32.4<br>(14.5)                   | 35.6<br>(13.9)                           | -3.2<br>(12.1)                                |                                                             |
|              | Below expected    | 64          | 42.8<br>(20.1)                   | 40.3<br>(16.2)                           | 2.5<br>(12.5)                                 |                                                             |
|              | Total structured  | 194         | 36.5<br>(16.9)                   | 37.8<br>(14.9)                           | -1.3<br>(11.9)                                |                                                             |
| Total        |                   | 679         | 37.8<br>(16.3)                   | 37.3<br>(13.9)                           | 0.19<br>(10.0)                                |                                                             |

tions that manufacturing companies tend to report later than service companies (Courtis, 1976). Lastly, based on data collected from expanded COMPUSTAT and COMPACT DISCLOSURE data bases, the dummy binary variable QUALIFIED reflects whether a company in ques-

tion received an unqualified (coded 0) or qualified opinion (coded 1) in 1984 (consistency and litigation audit reports qualifications were excluded from analyses.) As can be seen in Table 4, QUALIFIED was observed to correlate with TECH 1; it was found that nine of the 12 qualifi-

TABLE 4. Correlation coefficients

|            | AVER  | Log<br>(Sales) | Manufact. | Volitil. | Qualified | TECH1   | TECH2   | TECH3   |
|------------|-------|----------------|-----------|----------|-----------|---------|---------|---------|
| AVER       | 1.000 | -0.047         | 0.142*    | -0.027   | -0.003    | 0.038   | 0.026   | -0.008  |
| Log(Sales) |       | 1.000          | -0.021    | 0.042    | -0.032    | 0.081   | 0.068   | 0.039   |
| Manufact.  |       |                | 1.000     | 0.067    | 0.056     | -0.012  | 0.025   | -0.072  |
| Volitil.   |       |                |           | 1.000    | 0.078     | -0.011  | 0.025   | -0.017  |
| Qualified  |       |                |           |          | 1.000     | -0.138* | -0.039  | -0.035  |
| TECH1      |       |                |           |          |           | 1.000   | -0.547* | 0.398*  |
| TECH2      |       |                |           |          |           |         | 1.000   | -0.549* |
| TECH3      |       |                |           |          |           |         |         | 1.000   |

\*Significant at the 0.01 level.

cations were given by unstructured firms. As it relates to the regression analysis discussed below, a review of diagnostics revealed that a collinearity problem did not arise because no conditional index was found to contribute to two or more variables (cp. Belsley *et al.*, 1980; operationally, see also SAS, 1989, p. 672).

To ascertain consistency between the current data set and the results of prior research, and to continue testing the two hypotheses, the authors performed a regression analysis for the following functional equation:

$$\text{Date-84} = F \left( \begin{array}{l} \bullet \text{ Earning (above expected,} \\ \text{expected, below expected)} \\ \bullet \text{ Average announcement date} \\ \text{1980-83 (AVER)} \\ \bullet \text{ Size (log of sales)} \\ \bullet \text{ Coefficient of variation in} \\ \text{sales (Volatility)} \\ \bullet \text{ Type of audit opinion} \\ \text{(Qualified)} \\ \bullet \text{ Audit firm technology} \\ \text{(TECH 1,2,3)} \end{array} \right)$$

## RESULTS

The results of the regression analyses portrayed in Table 5, corroborate the findings of prior researchers in that the disclosure dates

generally appeared to be inversely related to the type of earnings announcements (below expected, expected, above expected) and the size of the client (SIZE).<sup>2</sup> In support of hypotheses  $H_1$  and  $H_2$ , there appears to be a significant relationship between clients' earning announcement dates, as conditioned by the nature of the announcement, and the technology of their auditors. That is, concerning  $H_1$ , given an above expected and expected earnings reports, the variables associated with a structured audit approach are significant at the 0.05 and 0.01 levels, respectively, thus inferring that the structured approach is faster in these earnings conditions. For intermediate structure firms, it appears that bad news earnings, are announced the fastest of the three audit technologies, (after controlling for common factors such as AVER and QUALIFIED), with the variables being significant at the 0.01 level. Finally, in support of  $H_2$ , unstructured firms are the slowest with respect to expected and below expected earnings announcements, with the variables significant at the 0.05 level. Thus, these results corroborate Table 3 findings.

Related to our reasoning that below expected earnings should be associated with increased audit scrutiny, all 12 audit report qualifications were associated, at the 0.01 level, with the below expected earnings group (see also Whittred, 1980). Consistent with our concern that announcement dates may be more attributa-

<sup>2</sup> In an additional analysis to that reported in Table 5, a dummy variable representing MANUFACTURING was included in the regression equation and diagnostics revealed that a multicollinearity problem existed with respect to AVER. Therefore, regressions were run both with and without MANUFACTURING and it was found that the results were virtually identical.

TABLE 5. Regression results by earnings categories (parameter estimates/*t*-values). Dependent variable — Date-84

|                       | Above<br>expected<br>( <i>n</i> =113) | Expected<br>( <i>n</i> =335) | Below<br>expected<br>( <i>n</i> =231) |
|-----------------------|---------------------------------------|------------------------------|---------------------------------------|
| Intercept             | 10.26                                 | 14.78                        | 7.18                                  |
| AVER                  | 0.839<br>(19.0)†                      | 0.772<br>(20.7)†             | 0.98<br>(14.5)†                       |
| Log(Sales)            | -0.713<br>(-1.44)                     | -1.07<br>(-2.99)†            | -0.43<br>(-0.66)                      |
| Volatility            | -0.24<br>(-1.56)                      | 0.20<br>(1.20)               | -0.31<br>(-1.56)                      |
| Qualified             | —                                     | —                            | 3.13<br>(8.18)†                       |
| TECH1 (unstructured)  | -1.91<br>(-1.03)                      | -2.17<br>(-1.98)*            | -4.26<br>(-1.87)*                     |
| $R^2$ (adjusted)      | 78.1%                                 | 60.8%                        | 66.3%                                 |
| TECH2 (intermediate)‡ | 0.91<br>(0.54)                        | 0.54<br>(0.50)               | -5.21<br>(-2.40)†                     |
| $R^2$ (adjusted)      | 77.3%                                 | 59.3%                        | 67.7%                                 |
| TECH3 (structured)‡   | -2.10<br>(-2.29)*                     | -2.27<br>(-4.45)†            | -3.63<br>(-1.50)                      |
| $R^2$ (adjusted)      | 78.6%                                 | 61.1%                        | 66.0%                                 |

\*Significant at the 0.05 level.

†Significant at the 0.01 level.

‡The parameter estimates and *t*-values are not presented for the quantitative variables in the regressions with the indicator variables TECH 2 and TECH 3 because they were not significantly different from the results presented for TECH 1.

ble to differential clients across auditors with respect to their inherent uncertainty than to the auditor's approach, it is noteworthy that the volatility measure was not found to be significant.

Generally, the overall functional model presented above appears to offer good explanatory power in terms of  $R^2$ s.

Table 6 presents the results of the individual tests for differences in means within the eight auditing firms, the three different audit technologies, and the three different earnings expectations. The dependent variable used to test for differences within each category was the difference between the disclosure date for 1984

and the average disclosure date for 1980–83 ( $\Delta$ Date). Three within-firm differences were noted for the auditing firms: PMM–CL, PMM–PW and TR–CL; it is noteworthy that each case represents a categorical difference between a structured and an unstructured firm. Consistent with these results, the within-category comparisons for audit technology also showed a significant difference between the structured and unstructured technologies. Finally, the within-categories comparisons for earnings expectations showed two significant differences: above–below expected and expected–below expected earnings.



TABLE 6. Probabilities associated with equity of means. Dependent variable =  $\Delta$  Date

|                          |                |       |              |       |                |        |        |        |
|--------------------------|----------------|-------|--------------|-------|----------------|--------|--------|--------|
| By Big Eight firms       |                |       |              |       |                |        |        |        |
|                          | AA             | AY    | CL           | DHS   | EW             | PMM    | PW     | TR     |
| AA                       | —              | 0.736 | 0.355        | 0.966 | 0.880          | 0.066  | 0.533  | 0.155  |
| AY                       |                | —     | 0.668        | 0.792 | 0.661          | 0.075  | 0.872  | 0.137  |
| CL                       |                |       | —            | 0.452 | 0.318          | 0.013* | 0.743  | 0.045* |
| DHS                      |                |       |              | —     | 0.867          | 0.106  | 0.628  | 0.188  |
| EW                       |                |       |              |       | —              | 0.112  | 0.470  | 0.209  |
| PMM                      |                |       |              |       |                | —      | 0.021* | 0.986  |
| PW                       |                |       |              |       |                |        | —      | 0.070  |
|                          |                |       |              |       |                |        |        | —      |
| By audit technology      |                |       |              |       |                |        |        |        |
|                          | Unstructured   |       | Intermediate |       | Structured     |        |        |        |
| Unstructured             | —              |       | 0.293        |       | 0.010†         |        |        |        |
| Intermediate             |                |       | —            |       | 0.076          |        |        |        |
| Structured               |                |       |              |       | —              |        |        |        |
| By earnings expectations |                |       |              |       |                |        |        |        |
|                          | Above expected |       | Expected     |       | Below expected |        |        |        |
| Above expected           | —              |       | 0.755        |       | 0.001†         |        |        |        |
| Expected                 |                |       | —            |       | 0.001†         |        |        |        |
| Below expected           |                |       |              |       | —              |        |        |        |

\*Significant at the 0.05 level; †Significant at the 0.01 level.

Next, the authors performed two separate ANOVA tests on the hypothesized relationship of earnings type and auditing firm, as well as earnings type and audit technology. A  $3 \times 8$  ANOVA design with  $\Delta$ Date as the dependent variable produced a significant model ( $P < 0.001$ ); it was, however, a model with a low explanatory power ( $R^2 = 0.06$ ). The type of earnings announcement emerged as a significant explanatory variable ( $T$  value = 4.2), but the eight different CPA firms were not ( $T$  value = 1.3). The  $3 \times 3$  ANOVA comparing audit technology to earnings type was, however, also a significant model with again a low  $R^2$  (0.06). Both the type of earnings announcements and the type of audit technology were significant ( $T$  values of 4.2 and 1.85, respectively).

Generally, the results of the testing presented in Tables 3–6 suggest support for both hypoth-

eses  $H_1$  and  $H_2$ . Thus, it appears that a significant relationship exists between the timeliness of annual corporate disclosures as reported in the *WSJ* and the type of technology an auditing firm uses. As portrayed in Fig. 3, judgmentally-oriented firms tend to delay the reporting of earnings that fall below expectations, while structured firms tend to be associated with the early release of earnings that exceed expectations. As found in Table 6, the difference between structured and judgmental firms appears to be most marked for clients experiencing below expected earnings. Furthermore, as demonstrated in Table 3, auditing firms that employed an intermediate form of audit technology revealed a more narrow variation in the timing of their earnings announcements irrespective of the nature of clients' earnings announcements.

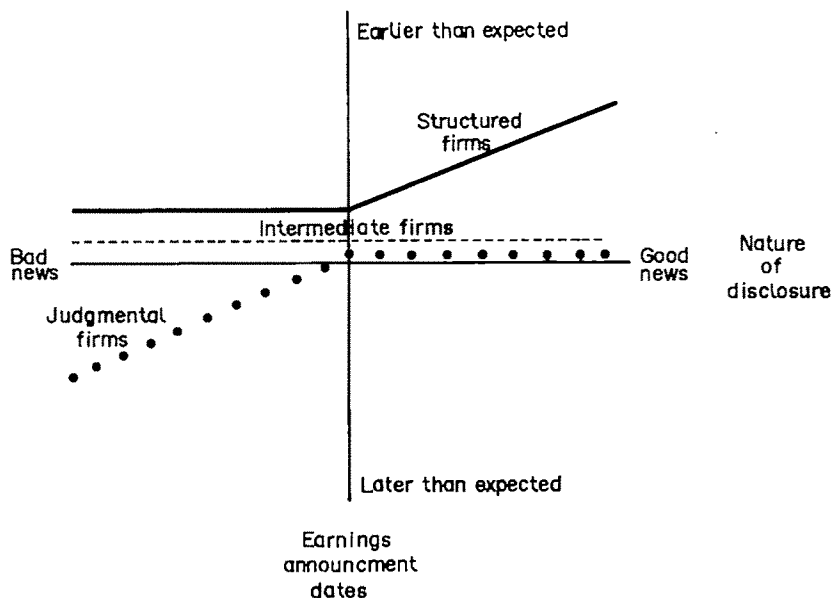


Fig. 3. Earnings announcement dates: nature of disclosure and audit firm technology.

#### IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

Implications arising from our analysis may be organized into those for research and practice.

##### *Future research*

Our results relating to  $H_1$  and  $H_2$  suggest that differences in audit technology appear to be associated with variance in earnings announcement dates. Thus, audit technology appears to influence the financial reporting process. Here, though, it is important to state the caveat that for unexpectedly low client earnings, delays in reporting may occur not because of audit efficiency, but because client management defers reporting the bad news to obtain more time to prepare a response to the negative reaction it will bring. For example, it may be harder to write the management presentation and analysis letter when bad news is reported. It is important to bear in mind, however, that our principal focus has been on the differential time delays across audit technologies where this management concern should remain relatively constant.

As noted in our findings, while the

hypothesized relationship appears to be statistically significant, it also appears to be fairly weak in terms of explained variance. On this point, Kinney (1986) noted that the degree of structure among the Big Eight probably does not differ widely from firm to firm. Similarly, Cushing & Loebbecke (1986) observed that even structured audit approaches should entail a reliance on judgment. Thus, the various firms comprising the Big Eight may be best described as "hybrid organizational forms" (Mintzberg, 1979). Consequently, the relatively low explained variance may have been expected because of the nature of the theoretical construct studied (see Table 1). However, the low explained variance may also be attributable to weaknesses in the operational measures used. Therefore, as a first implication, future researchers should concentrate both on refining the research model's theoretical specification and on modifying the refining operational definitions and operational measures used for dependent and independent variables. In any event, for researchers interested in examining earnings announcement patterns, audit firm structure appears to be a relevant construct.

Second, our results suggest that structured firms are associated with the early "good news" while judgmental firms are associated with the later reporting of "bad news." While concern for the efficiency attributable to audit technology is appropriate, an overshadowing concern relates to the effectiveness of each form of audit technology. On this point, Cushing & Loebbecke (1986) noted, for example, that while a structured approach may achieve greater efficiency in routine audits, the drive for standardization may not encourage an auditor to focus on a client's unique problems. For example, as reported in the preceding section, qualified opinions were found to be associated with surprise bad news earnings, announcement delays and unstructured audit technologies (see Tables 3 and 4); one may preliminarily reason that the extra time taken made it possible to better understand a problem area and give an associated qualified opinion. A question arises, did the time orientation of structured firms contribute to their overlooking problem areas requiring qualified opinions? Following this line of reasoning, future research should be directed at studying the financial reporting impact of audit technology and the incidence of associated financial reporting deficiencies.

Third, and consistent with Mintzberg (1979), the categorization of auditing firms with respect to structure-judgment represents only a snapshot of contemporary practice. A more complete picture would include focusing on the processes whereby complementary and conflicting forces contribute to the development of differing audit technologies. Consistent with this theme, Fig. 1 depicts an array of forces that may be subjected to future study. Toward this end, previous work by Dirsmith & McAllister (1982a, b), Kinney (1986) and Cushing & Loebbecke (1986), suggest two related hypotheses (1) because of statistical properties related to regression to the mean, as embodied in institutional processes that tend to homogenize practice (DiMaggio & Powell, 1983), outlier audit technologies (structured and judgmental) will tend toward an intermediate technology over time (that is to say, variance across firms will de-

crease); and (2) bureaucratization tendencies in contemporary organizations will incline firms toward increased structure over time (see also Willingham, 1987).

A final implication concerns the philosophical orientation of the existing research. Simply put, we believe the extant literature is biased. On the one hand, Dirsmith & McAllister (1982a, b) point the evolution of auditing toward an "organic" process tending to emphasize the exercise of professional judgment. They concluded their analysis by considering the benefits and dysfunctions accruing to organicism, as well as threats to its continued existence. By contrast, Cushing & Loebbecke (1986) concluded their empirical analysis with a discussion of the advantages and disadvantages of audit "structure," and oriented themselves toward structure insofar as they failed to consider the advantages and disadvantages of the "unstructured" approach. Similarly, Kinney (1986) considered the voting patterns of ASB members with reference to structured-unstructured audit technologies and then examined the economic costs to be incurred by unstructured firms in becoming more structured. Thus, this research is oriented to either judgment or structure. In fact, even the terms used reflect biased connotations: judgment, structure, organic, mechanistic, professional bureaucracy, machine bureaucracy, etc. Even the current study is biased. In studying the effect of audit technologies, we oriented our results toward the structured end of the continuum in the sense that we defined judgmental firms in terms of forces having a stronger impact on structured firms with respect to time (see Fig. 2).

Our point is that considering the functions and dysfunctions of one polar characteristic like "structure" does not eliminate the obligation to consider the dysfunctions and functions of its opposite (Copi, 1973). Both organizational approaches have their functions and dysfunctions, and each descriptor is merely that—a social invention, a metaphor useful for describing only very limited aspects of auditing (see also, Dirsmith *et al.*, 1985). We recommend that researchers, at a minimum, should come to terms with their own philosophical loyalties while

conducting their studies.

### *Audit practice*

The contemporary literature on successful organizations (for example, Peters & Waterman's *In Search of Excellence*, 1982), urges companies to recognize and then steadfastly adhere to their underlying organizational philosophies. Accordingly, perhaps the firms subscribing to the differing audit technology orientations should be proud of and steadfastly adhere to their underlying philosophies. We find such a prescription to be misguided.

Given the complexity and dynamism of the current audit environment, auditors should, to be sure, develop and then adhere to an audit philosophy, but should also continually reflect upon that philosophy and try to anticipate where it could lead them astray (Schon, 1983). Our  $H_1$  findings suggest that clients in a relatively strong financial condition, as exemplified by unexpectedly high earnings, should perhaps adopt a structured approach that stresses audit efficiency (we say "perhaps" because the strength could be attributable either to economic well-being or to possible misstatement). Of more concern here are the companies producing unexpectedly low earnings. Here, the auditors should question whether or not efficiency has been overly stressed in the audit. What may be called for is a contingency approach to auditing, wherein unique circumstances trigger a switch from pre-established plans and checklists over to a tailored approach that relaxes the emphasis on efficiency and places appropriate focus on effectiveness. One way to trigger this switch would be to use "last-day-of-use signals" for pre-established plans, statistical sampling guidelines, questionnaires, etc., that must be self-consciously re-activated before they may be applied to the start of an audit.

The same general case may be advanced for the organic audit approach ( $H_2$ ). Perhaps for

clients announcing unexpectedly low earnings one should use a tailored approach. Here though, because the organic approach may not appear to be as integrated and comprehensive as a structured approach (Cushing & Loebbecke, 1986), auditors should also make certain that their working papers are logically and legally defensible to nonexpert external parties (Meyer & Rowan, 1977). By contrast, in instances of strong economic performance, the organic approach might fail to stress efficiency enough. Again, a contingency plan in which one switches off the tailored approach and adopts a reflective use of standard operating procedures may be called for.

Similarly, the intermediate audit approach is not free of criticism. Rather than drawing upon the strengths of both the structured and organic approaches, the intermediate technology may sometimes achieve neither the benefits of structure nor of organicism. Thus, practitioner reflectivity is again called for.

### *Epilogue: a derivative implication for researchers*

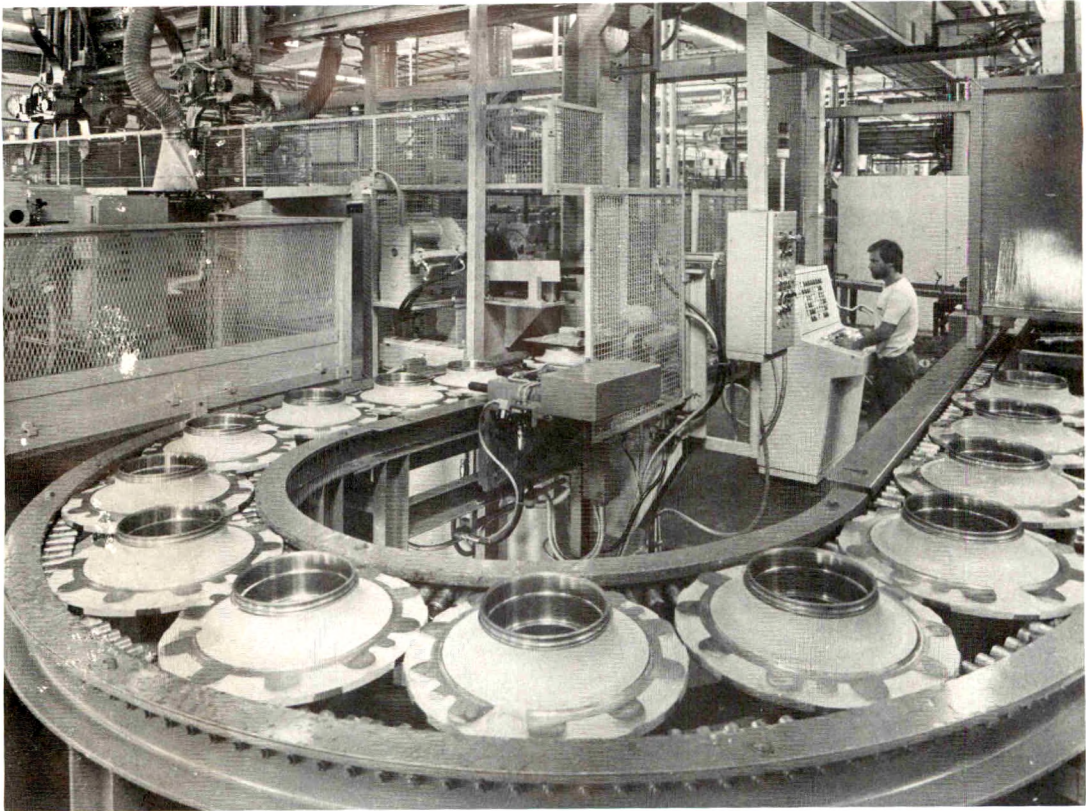
Earlier we raised the issue of bureaucratization of organizational practice — the tendency for organizations to become more alike without necessarily improving (DiMaggio & Powell, 1983). One force contributing to this trend involves the inclination of academics to build knowledge bases and thereby gain scientific recognition and status. Our own prescriptions for practitioners might fuel such a trend. That is, to the extent that practitioners reflect on the audit technology at hand and perhaps change it, these technologies may become more alike without necessarily becoming better. Consequently, we urge future researchers to reflect on their own activities and to recognize that they themselves, through their research, publications and memberships on various task forces, are an active element contributing to the further bureaucratization of audit practice.

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## **ACTION FORUM**





## LIFE WITH A SUB-CONTRACTOR: NEW TECHNOLOGY AND MANAGEMENT ACCOUNTING\*

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### Abstract

The kind of new technology that has been installed in advanced industrial production at an increasing rate over the last few years sets a new stage for the development of management accounting. Flexibility makes extreme adaptation of production to meet customer demands possible. Mass production of individualized products makes product costing problematic. Control of operation has to be decentralized while the design of production systems has to be centralized. The function and use of a traditional management accounting system should be questioned. What are the important issues that prompt industries to install new technology in the first place? Is it flexibility or is it quality that is the prime mover? Is it both? Or might it be efficiency? Whatever the case may be, it is necessary to clarify trade-offs between aspects of the new production facilities. Causal links between activities and costs have to be reestablished. The simple relations between volume and costs are no longer valid. This paper deals with these issues against a background of current research on local information needs in automated industrial production and a solution linking local and central systems is proposed.

In mature industries like cars, trucks and household appliances it now seems that an important part of the competitive struggle is and will be fought on the shop floor. Producers that are able to exploit new technology to achieve flexibility and good quality will have a competitive advantage, provided that they are better at learning from experience than the others. Organizational learning, including learning to unlearn behaviour conditioned by old technology, could possibly be supported by properly designed management accounting, and other, systems. But it will also require specific organizational efforts to decentralize important decisions to the operative level. Central design efforts deal with normalcy, given a certain set of operational assumptions, while the operational level deals with the prevention of deviations from the norms. This latter task becomes increasingly important with the rising costs of expensive equip-

ment standing idle or producing substandard products.

Can management accounting systems be redesigned to support cost center managers in their task to avoid or alleviate abnormal situations and to conduct experiments with standard operating procedures under the regime of a constantly changing and constantly new technology? If this is possible, the problem can be approached through a far-reaching decentralization of decision-making powers to foremen and production teams. If it is not possible the remaining approach is to retreat to Taylorism, only that it would not be handicapped by the weakness (Morgan, 1986) it used to have — people not being willing to behave like robots — now people would be replaced by robots. Even in that case, it would still be a question of designing production systems for normalcy and to build more certainty into the system by buffering dis-

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turbances. Learning would then occur in the department for the programming of robots, rather than among operators where motivation would be low.

In this paper the former approach has been studied — learning to learn in the operative setting. The empirical data on which it is based have been gathered over a period of two years in a manufacturing sub-contractor in a mature industry, where production automation has been driven quite far.

The strategic choices for a successful sub-contractor are limited. Dependence on the principal's strategy grows with success especially if the sub-contractor is responsible for a strategic part of the production process. All kinds of integrative links are formed. Information technology is used to feed product designs more or less directly into the production machinery. Investment in new machinery has to be coordinated with product design. Budgets and delivery plans have to be adjusted to the outcomes of the marketing efforts of the principal in order to maintain inventories close to zero. Quality requirements are deduced from the market positioning of the products of the principal and prices are fixed in budget negotiations. Sooner or later the sub-contractor will be bought by the principal. Sooner if the sub-contractor is a producer of strategically vital parts of the final product. But the principal will always keep the option open to go elsewhere to buy that vital part. However far integration with the principal has advanced, there is indirect competition and comparable establishments.

Return on capital employed, that key to management control, will normally be the responsibility of one of the product divisions of the principal. Coordination of materials flows, financial flows, capital investment, product designs, purchasing and the development of information systems also will be managed by the product divisions.

Against this background it is obvious that even if a sub-contractor may be a huge establishment, it still has the strategic options of a cost center. Management of operations is the strategic issue for a sub-contractor and if flexibility and deliv-

ery of high quality products adapted to customer demand is the competitive advantage sought by the principal, it also is for the sub-contractor.

An attitude towards new technology in relation to operator competence is revealed by the chosen balance between two factors. The factors are mutually dependent, but the organization could emphasize (a) the improvement of its competence to design and implement production systems that use new technology, or (b) the development of its competence for local learning from operative experience (i.e. its cost-improvement curves would slope steeper than those of the competitors). We posit that the most important strategic factor in the long run is the latter aspect, and we found a sub-contractor of considerable size which was working with this emphasis.

The question was what kind of information support is needed for local learning processes if the learning is directed towards cost improvement? A field experiment involving three foremen/supervisors and their teams was initiated. The experiment was designed to be non-interventionist. It was limited to providing the teams with a personal computer, some extra controller services and some attention from the research team.

The experiment had been running for about two years at the time this report was written. Top management and the unions are convinced that this is the proper way to approach cost improvement in highly automated production with decentralized economic responsibility and want to go for full scale implementation.

The outline of the paper is that we first present the rationale behind the approach which includes a short resume of a series of interviews with the management team of the sub-contractor, then we present the experiment and some of the results and finally we draw some conclusions.

#### RATIONALE FOR THE APPROACH

##### *The source of problems in practice — complexity and change*

Most of the problems of managing production

in a highly automated production system stem from the advancement of technology itself. The main reason for wanting to invest in new technology is the flexibility it allows. It is possible to gear production very closely to customer demand and to satisfy an ever-increasing demand for variation in the product line. The drastically shortened set-up times with new technology, make it possible to produce in very small batches and still have mass production. A direct consequence of small batches is lowered inventory and an increased capital turnover. Furthermore, automated production contributes to a high and even quality of the output which in turn increases the reliability of the system and decreases the need for buffering inventory. However, timing then becomes a crucial factor, making it necessary to have a rather elaborate coordinating and monitoring system to assure just-in-time delivery of the right type of product. This control system adds to overhead. Every second hour on the hour a large truck leaves one of the sub-contractor's plants and the specified goods have to be aboard. Delays are so costly that they cannot be allowed. Machine hours are very expensive in comparison to man-hours, which makes efficient use of machinery a primary task for the organisation. Furthermore, there is a continual flow of investment in new machinery. Trimming and test runs seem to go on everywhere all the time. It is important to get new equipment into productive use very quickly, but since there is always something that is new to engineers as well as operators, stoppages will occur. The organisation is learning to use new technology all the time. It will also have to become accustomed to running parallel systems of different technology for the same product. In such an environment, motivated and alert employees will provide the necessary buffering activities to avoid unintended consequences of complexity. Complexity also makes cost measurement problematic. Somebody said "Variable costs do not change much but fixed costs keep changing all the time!" Top management in the sub-contractor is not satisfied with the reports they get from the management ac-

counting system. "Too much information and too late" is the general opinion. A project to redesign the system seems so staggeringly complex and it is not quite clear what kind of cost information is really needed. So the talked-about new MAS-project is postponed.

In the meantime, times are good for the principal. There is great pressure on the sub-contractor to increase output. As a matter of fact, it has been producing well above normal capacity over the last few years. This, together with the intensive drive towards high quality and zero defects, has increased cost, especially semi-fixed items like tooling, maintenance, rejects and overtime. There have also been stoppages, mainly due to the installation of new production facilities, based on new technology, but also due to the suppliers of new technology equipment being unable to provide qualified assistance at short notice. It is simply necessary to go on investing in more automation. The principal is very tough on prices. According to the optimistic calculations for the new equipment, which the principal finances to a considerable extent, there is supposed to be a considerable cost improvement effect. Therefore it is necessary to have a general costimprovement of several per cent. It is very easy to show cost curves and calculations that prove this point. The problem is how to obtain such results! How to do it with many thousands of people working in several different plants and with ever-changing technology.

In one part of the production process there seems to be a stabilized solution. The assembly lines do no look like assembly lines any more. They were eliminated some time ago. The units to be assembled arrive at work stations on trolleys following magnetic tracks in the floor. At those stations a team performs a larger set of operations than used to be the case in the old days. Now attention is focused upstream on the production of the parts to be assembled.

The problem seems quite clear; the sub-contractor has to continue investing in new technology at a very high rate and be good at cost improvement at the same time!

*The scientific problem — researching the unique*

In a more abstract sense there are two sides to the problem; the introduction of new technology into production processes is a design problem, the cost improvement problem is a local management problem. The first one is an engineering task. The second one is our concern in this paper.

Local managers, foremen and supervisors will work with their teams to improve procedures and practices largely inside a given technology. It is true that operators participate in testing and adapting new machinery, on site in suppliers' plants as well as at home, but the important day-to-day work is done inside a given technological framework. However, there are hundreds of local, unique combinations of equipment providing the separate, technological frameworks inside which unique teams operate. It would be foolish to assume anything else than that cost improvement and procedural change in those settings have to be managed locally. There will be different solutions depending on the task, the technology, the competence of the people involved and the information used. We are interested in how solutions are worked out and changed and what kind of information is used in the process.

Since it is learning over time that is in focus and since it is desirable to provide for the discovery of causal links between information use and solution outcomes, an extended period of close observation is needed. Much like ethnography!

All scientific study intends observation (i.e. the criterion is whether observation of some part of reality is intended or not). Observation is perception but one that is planned and prepared. We want to generalise observations in a way that makes them applicable to other settings. It is this, the epistemological status of different types of generalisations that so much of the methodological debate in the social sciences have dealt with lately.

Ethnographers are less interested in making predictions than in understanding and explaining situations that have occurred. The aim is to establish a connection between something that

has been said or done (observed) and a larger pattern, between the unique observation and generalized rule systems, between one (activity) language and another (analytic). "Ethnography is at its core a process of 'mediating frames of meaning' (Agar, 1986, p. 19).

In their work ethnographers deal with different kinds of data sets ("strips") describing encounters, events, traditions, etc., and focus on differences. Something does not make sense; expectations are not met and there are "breakdowns" (Agar, 1986) that have to be resolved. In the resolution process — the movement from breakdown to understanding — schema are applied until a coherent account can be made of the breakdown. If the same schema can account for several "strips" we are on our way towards generalisation.

Ethnographers take a learning attitude and they can almost never be sure that they have learned the right thing. A different ethnographer studying the same culture may come home with a different story. Does this mean that ethnography is useless? Certainly not! Pointing out unexpected things and making sense of them is an important part of our common effort to understand the world around us a little better.

In addition, there is the matter of the epistemological status of observations made in specific settings. We beg the reader to view this report as an ethnographic report by a couple of academics who have spent some time (certainly not enough for real understanding) "out there" and come back with their story. We also beg the reader to consider the possibilities of generalising from single cases by establishing multiple connections to accepted bodies of knowledge.

#### APPROACHING TOP MANAGEMENT

The task of gaining permission to carry out a field experiment in a company in an industry characterized by very strong competition, is a delicate one. There has to be rapport with top management and a good anchorage for the study on the local level. The opportunity to get access to the sub-contractor was the fruit of coinci-

dence and a common interest in decentralization. When the top management team of the sub-contractor was approached it was immediately willing to include a project on local management information systems in a long term program to delegate decision responsibility and to generate commitment to the strategy of the company. In this section the arguments that persuaded top management are presented. First, the results of interviews with all members of the management team will be used to introduce the reader to the problems that the team faces. (These interviews were done when the experiment had been going on for about a year.)

All the members of the management group have a keen sense that the sub-contractor company has to be the best in the world in its business, since the principal has the policy to buy elsewhere if more cost-effective offers are presented. They also believe that they are doing a good job, carefully monitoring what competitors are able to do.

The strategic orientation of the sub-contractor is expressed in four objectives. Quality comes first. It is the basis for the strategy of the principal and it is extremely important that the reputation for quality is not tarnished. No mistakes on quality can be allowed. Sometimes interviews give the impression that a trade-off between quality and other objectives cannot be contemplated. Although quality at any cost is not a proper description of the attitude, the penalty for producing below specification is considered prohibitive on several dimensions.

Two of the other objectives — just-in-time-delivery and flexibility — are almost identical if analysed closely enough. The productivity goal is number four in ranking but one must not forget that the other three are more or less directly linked to productivity. It is a concept that has been used since the introduction of Taylorism and is well established in the company. Productivity is more commonly referred to in discussions than the return on investment concept that is included in the management control system.

In general, top management members are not willing to admit that the productivity measure is

too complicated for employees to calculate (it is adjusted for inflation as well as volume and mainly used to compare performance between years). One does not need to do the calculations, they say, instead one should use common sense to understand in what direction a specified change will effect productivity. Neither do managers find any problem in weighing goal dimensions, which seem to be treated as independent aspects of performance. Quality is to deliver products according to specification, productivity according to budget and just-in-time according to plan. Flexibility is thought of as the number of set-ups per period, something which they should try to increase.

The sub-contractor has a very strong tradition of the Tayloristic management of production; "an operative culture", as one of the interviewees put it. In fact some of the leading engineers, e.g. those on professional committees on efficient production, had come from the sub-contractor. Now the manager in charge of organizational development sees past success as a potential weakness when the sub-contractor tries to achieve flexibility by introducing new technology at a high rate into an organization that has won its victories through standardization and good engineering. What is needed now is real competence to assimilate new systems, i.e. the ability to unlearn old standards and to learn new approaches. The company finds itself in a squeeze between the well-known Taylorism and modern leadership ideas.

As to stability vs turbulence, the management group is in agreement that the principal provides a fairly stable environment but the changing technology is a turbulent factor and there is a general movement towards more turbulence.

When asked about what can go wrong, managers tend to talk about quality or delivery problems and they return to the fact that a large number of the problems that have occurred over the years have been due to human error. The current trend is that new production systems are very efficient when things are normal but they are increasingly sensitive to disturbances. The human factor sets limits to what can be achieved with new technology and there have been signs

that technical change has been somewhat too high recently.

Engineers also dominate. It is an engineering culture. When managers describe the four goal dimensions they tend to talk in terms of abstract planning concepts, and when they are asked about problems or threats they tend to talk in terms of incidents or episodes on the shop floor, indicating that people are not aware of the significance of quality or of what things cost (e.g. plans are good but the ability to carry them out is not good enough). The management group believes that the solution to the problem of balancing human competence and the rate of introduction of new technology should be sought in the direction of further decentralization of operating decisions and they seem to expect that it can be done in a relatively short time.

#### ARGUMENTS FOR DIFFERENT LOGICS IN DIFFERENT SYSTEMS

Suppose we have established local teams with leaders committed to contribute in terms of skills and experience in interpreting direct observations of the work process. Do these teams need the same kind of information as central managers do, only broken down into more detail? In this section we will argue that it might be counter-productive to use conventional ideas of integrated information systems design to persuade locals to use a centralist coordinative, analytical approach to local problems.

We want to show that a plausible distinguishing characteristic of successful early adopters of new technology is their ability to let central, analytic, design solutions interact with local, processual, experiential adaptations, in a problem-solving process that is a dialogue between central design and hundreds of operating teams.

Since different types of control are used at the central and the local levels of an organization, and since different types of data are used, it is most likely that different types of learning take place. To use familiar terms, the local level develops differentiation in response to unique local situations while the central task is integra-

tion. Special care should be taken in designing the interface between these two logics. We would like the interface to be able to deal with both logics. The aim is to combine analytic and experiential learning.

#### Controlling operations

Ouchi (1977) identifies two ideal types of control, output-oriented and behavior-oriented.

|                           |     | Causal knowledge  |                 |
|---------------------------|-----|-------------------|-----------------|
|                           |     | Clear             | Unclear         |
| Good performance measure? | Yes |                   | Output oriented |
|                           | No  | Behavior oriented | Ritual          |

Fig. 1. Two types of control (Ouchi, 1977).

These are illustrated in Fig. 1. Output-oriented control is based on *ex post* measures of results (efficiency, productivity, return on investment). If there are output measures that adequately picture what the organization wants to accomplish, it is a very information efficient type of control. It does not presuppose any causal knowledge about operations at the center. Responsibility for operations is delegated to locals and all that is needed at the center is regular reports on the output measure and demands for corrective action in case of deviance from target values. Output-oriented control needs comparable figures that can be included in calculations and models of different kinds, which necessitates standardised measures, preferably in monetary terms. Therefore output measures cannot contain knowledge about reasons for deviances from desired outcomes. Output-oriented control deals with official standard measures that give facts about outcomes and demands that the responsible local manager should do something about shortfalls or, in case of inadequate capacity, allocates more resources.

Behaviour-oriented control prescribes what should be done. It controls by rules. If the rules under the heading "Bouillabaise" in the cookbook are followed the outcome will be bouillabaise. The causal knowledge needed for desirable outcomes is laid down in the rules. Rules for

control purposes have to be formulated in advance and be known by those that are to be controlled. Professional groups like accountants, lawyers and doctors are controlled in this way. Discipline is maintained through some kind of legitimation authority. The ones who break the rules may be punished by losing their charter. The problem for those that are controlled is to determine whether this is a situation that calls for rule A or not — to determine a diagnosis. The problem for the controlling authority is to formulate the rules because rules have to be stated in general terms while their application is always to a unique situation. Practices develop around sets of rules and practices may change with changing conditions. When practices have drifted far enough the rule book has to be revised. Rules may be self-imposed maxims based on own experience, or directives given by external authority.

The point is that even in advanced industrial production a large part of local work processes is controlled by self-imposed, often tacit, behavioural rules, which could be labelled experience or skill. Their main characteristic is that they are causal in content and propositional in form ("If I do X then Y will happen"). Causal knowledge is clear to the extent that operations are "known" (compare with Fig. 1). The task of the local manager is to experiment, within the overall technological structure, with these behavioural rules to achieve improvement, e.g. cost-improvement.

The box called "Ritual" in Fig. 1 refers to a situation where there is neither clear causal knowledge nor good performance measures (like in a university!). Under those conditions management decisions become more or less decoupled from operations and learning is virtually impossible; since there is no clear causal knowledge it is not possible to know which action leads to desired outcomes and, since there are no good performance measures, it is not possible to learn whether things have improved or not. One might imagine that this box illustrates the situation when new technology has been installed but while it is still not yet functioning as expected. The choice then is to try to reach control

by (a) designing good performance measures, or (b) designing behavioural rules that will lead to desired outcomes. Obviously one would like to do both. However it is soon realized that performance measures presuppose a great deal of knowledge about the process — the goodness of the measures stems from relevance — from central as well as local viewpoints. Also, the design of behavioural rules is difficult due to the lack of causal knowledge. In this situation experimentation to gain knowledge is required. It is essential that this is done locally.

A discourse on the role of reinforcement in learning might be in order here. One might argue that bonus payments tied to performance measures could speed up the learning process in the face of new technology. There is, however, plenty of empirical evidence in psychology (e.g. Wilson, 1980, chapter IV) showing that reinforcement is inefficient in the absence of relevant learning hypotheses (expectancies). Reinforcement does not produce hypotheses!

This argument is intended to show that local entrepreneurial leaders work with the design and redesign of behavioural rules that presupposes a great deal of causal knowledge. They work with the behaviour-oriented type of control. At the center, on the other hand, where coordination of and resource allocation between several local units are the tasks, it is not possible to deal with causal knowledge. Output-oriented control is used and analysis of standardised output measures is geared to the overall goals of the organization.

Local and central leaders therefore face different tasks and, as a result, are using different logics. It is not likely that an integrated, single-logic, information system will serve them both well. In fact we maintain that a large part of the economic efficiency of an organization is laid down in local standard operating procedures. It is not the case that organizational members always do calculations or economic judgements before they act. Instead members act as usual, i.e. according to experientially based standards. Only if they don't "know" what to do will they use some kind of explicit decision process. This means that it is unlikely that information systems

designed to serve central coordinative purposes will be very useful in serving local operative purposes. The two types of control imply different kinds of learning processes.

### *Types of learning*

Behind the celebrated Boston Consulting Group imagery (Star, Problem child, Cash cow, Dog), there is the simple logic of the cost improvement curve. If a firm's market share is larger than those of its competitors' it is likely to have lower costs since it accumulates more experience than they do. As a consequence of more experience it has "debugged" work processes and designs to a larger extent than those with less accumulated experience (*ceteris paribus*).

How does the kind of learning assumed in cost improvement manifest itself? Obviously in improvements in the design of operations, products, machines, organization, etc., and by balancing capacities and exploiting economies of scale. Possibly also in the motivational effects of doing a good job.

Changes have to be based on a causal knowledge of the processes, and that knowledge can only be gained by direct observation of the processes themselves. Output measures do not contain causal information. A less than satisfactory output measure can indicate a need for change, but it cannot provide information on what the consequences of changes in procedures might be. Causal knowledge about the processes in which organizations engage is to a large extent sedimented in operating procedures.

Taylorism and its present application in Japanese production management (Shingo, 1984) is the science of improving operating procedures. The method to achieve these piecemeal improvements is experimentation and direct observation of outcomes, i.e. trial and error. This kind of learning is what Argyris (1977) would call single loop learning. By definition — and in line with Dore's introduction to Kamata (1984) — success presupposes a discipline, and stamina, based on unquestioning adherence to the rules laid down by the present regime.

The task of local managers is normally single loop learning, given the regime of the current design of the production system. However, there are powerful stabilisers. Behavioural rules are cemented in budget models that describe normalcy and management accounting systems that display deviations from what is normal in reports. Learning then is experiential but constrained by the structures of normalcy, i.e. the world is seen through the conceptual model provided by the budget and other standard setting management tools.

However, if procedures of normalcy are to be questioned, single loop learning is not enough. The problem with regimes and leadership related to regimes is that leaders have to display confidence and belief in the behavioural rules for them to be efficient. Regimes are not designed to question themselves.

In order to gain commitment in a society characterized by industrial democracy, behavioural rules have to be set locally. The disciplining regime must be the property of the local teams. Then the behavioural rules find anchorage in operations and can be developed experientially in direct observational contact with the work process. Local learning should be experiential and associational.

Double loop learning takes place when assumptions are questioned and a new set of assumptions (a new strategy or regime) is established. The difficult part of double loop learning is to unlearn old habits. In all probability (Mitroff, 1983; Argyris, 1982; Hedberg & Jönsson, 1978) it is necessary to have quite strong indicators (performance is unacceptable) before the habitual actor realizes the need for change. To unlearn old ways the individual needs hard facts which show that things are not working. These facts should preferably be output-oriented. Then the actor realizes that accumulated experience has to be searched for new clues to improved performance. The triggering information will be on output, while search and problem-solving will again focus on causal information. In order for output information to have this triggering effect when it is needed it must be considered relevant and factual by the receiver. Relevance



and factuality relate to the theory-of-the-world implicit in the interpretative model that the actor uses to evaluate information on the process. The conceptual structure of that model tells the actor what is relevant. If the actor understands or believes he understands how the output measures are generated from the process he will tend to consider them factual.

If the information is considered relevant and factual the actor perceives a redesign problem (how to establish a functional set of behavioural rules); if not, interest may focus on the correction of the measures or on their manipulation rather than change. Learning of this kind, when the objective is to establish a new regime of behavioural rules within which rational judgement can again be practiced, is structural or conceptual as opposed to processual or experiential (Wilson, 1980).

Over any extended period an organization will use both kinds of learning; structural at rare *de novo* design or crisis like events, experiential most of the time under "normal" conditions. The question is to which structures structural learning is geared — overall financial goals and objectives or operational causal structures. If entrepreneurial tasks are given to local teams there will be less "budget-constrained behaviour" (Hopwood, 1973) and more structural learning locally. This effects the usefulness of the traditional management/cost accounting system. In other words, the two types of learning imply different kinds of data need.

### *Types of data*

Häckner (1985) found, after extensive case studies of information use by strategy-making groups in medium sized firms, that there were differences in the type of information used depending on the character of the strategic situation. In situations characterized as defensive, i.e. when an organization performed poorly, resources were scarce and the organization had to cut losses by laying off people, reducing product lines, etc., strategy-makers relied heavily on "hard" data. In offensive situations, on the other hand, when the task was conceived as conquest of new markets, growth and implementation of

new technology, they tended to use "soft" data.

Hard data, facts and figures, in the form of costs and calculations that describe the present situation and likely future outcomes, are used to justify strategy in defensive situations. In such situations there are conflicts of interest. People worry about their jobs, the bank worries about credit risks, etc. Then a primary task for a strategy-making team is to prove that the proposed measures are necessary. Hard data are useful as evidence in situations where scepticism and uncertainty are important factors.

In offensive situations, when new territory is to be conquered, unity in views as to future possibilities is built with the help of soft data. Such soft data constitute wholes, images of future states, visions or scenarios that appeal to imagination and wishful thinking (Jönsson & Lundin, 1977) and serve a mobilizing function (Brunsson, 1985). In those situations, calculation and cost figures seem to have little impact on strategy formulation, even if they may be used to legitimize proposed strategies in public presentations. "Hard data" are used for rational discourse within a given frame of reference. "Soft data" are used to build preliminary causal maps in uncertain but positively loaded situations.

This line of reasoning is supported by Merchant (1984) who found that performance was negatively correlated with required explanations of variances and positively with participation in budgeting, and drew the conclusion that performance might be an important independent variable. It may also be significant in solving some of the interpretative problems that bedevil accounting applications of contingency theory (Govindarajan, 1984; Dent, 1984; Otley, 1978).

If we apply this reasoning to the relation between management control and operations management we would conclude that central management control will use "hard data" on output in analyses against plans and budgets, while local operations managers will use "soft data" in the form of causal knowledge, experience, skills, visions of the perfect operation, and perceptions of the current situation in the offensive development of new procedures and processes. Hard

data can be accumulated in hierarchies of units, soft data cannot. To the extent that data are soft, control is behavioural and learning is associative and experiential. The conclusion seems inevitable. Operations managers will not be served well in their endeavours by information systems designed for management control purposes (unless they are in defensive situations).

To sum up the argument so far:

- Different types of control are found on different levels of an organization; lower levels that are more operative than higher ones relying more on behavioural control.
- There are also different kinds of learning on different levels. On lower levels learning is likely to be experiential and based on direct observation of processes, while the integrative and coordinative levels are more likely to use structuralist learning based on conceptual models.
- Finally, hard data are likely to be used in "stewardship" situations while soft data are more prevalent in learning situations where new frames of reference are built on cost improvement experiments.

This adds up to a conclusion that one would expect different kinds of information to be useful at different levels of the organization. Whatever the information problem is in a specific organization, it can probably not be solved by one integrated information system built on one common set of concepts. A system designed from a central, coordinative perspective will not satisfy local needs for learning purposes. On the other hand, it is obvious that the sum of local systems cannot satisfy the information need for coordination purposes.

There therefore seems to be a case for two types of systems, local and central. There is also a need to focus attention on the interaction between the two systems; hard data from the central one signalling a need for change in local behavioural rules.

Granted that the argument contains some speculation it might still be considered attractive enough to take the line of thought a little further. It has sometimes been said (e.g. by Johnson & Kaplan, 1987) that management accounting systems fail to provide relevant infor-

mation to managers and that systems are not used in accordance with their designers' intentions. Maybe the explanation to this anomaly is to be found in a missing link between central and local ways of sense making.

Moreover, the salience of the argument is increased by a number of other issues:

- Concerns with industrial democracy, like those in Sweden during the last few decades, have stressed the importance of adequate information support for a genuine participation in problem solving tasks by employees. As Hofstede (1968) noted some time ago, the relation between participation in budgeting and performance is more complicated than anticipated. In both cases there are obviously insights to be gained from the further study of the interaction between central and local views.
- The introduction of new technology into production processes is increasingly an important issue for unions. It is likely that economies where employees and unions can reach agreement on the principles of the automation of industrial production will have a competitive advantage over those that approach the problem in a confrontational mode, something that further increases the significance of new knowledge and understanding in this area.
- Micro-computers are often considered to have the right characteristics for use in building local (and often temporary) information systems. However, the proper application of this technology is contingent upon knowledge about the effects on performance of central-local interaction rules.

We consider such issues to be important, theoretically as well as practically. They deserve further study. Two problems seem critical from a research point of view. First, how should the two levels of information systems be linked (they obviously must be to form a coordinated whole out of a large number of commitment-filled local units)? Second, how can the functioning of such linked information system complexes be studied?

As to the linking of local and central systems, our proposed solution was that the systems should be kept separate and that the link should

be a pair consisting of a driving, experimenting leader and his or her assisting worrying controller. Local leaders will base their experimentation on their causal knowledge of the process, use soft data to a large extent and learn experientially. They will believe in what they are doing and convey a confidence and an action orientation to their teams. Local controllers will worry about imminent catastrophies and analyse reports from the central system hunting for signs of deviations from normalcy. They will sound the alarm when there is clear cause for initiating unlearning, when hard data show that current practices are not working (output-oriented control) but most of the time they will compile data from a large number of data bases, that are available, but rarely fully used, to support the rationalisation projects carried out by the leader and the team. Leaders will probably have the weakness that it is difficult to convince them that they are wrong. Setbacks will be considered temporary and as signs of a need for greater efforts (Hedberg & Jönsson, 1978). Leaders cannot exhibit too much hesitancy, deliberation and lack of belief without undermining their own leadership. Therefore they are slow in recognizing needs for changes in approach, especially if they have been successful for some time. Therefore they need professional worriers (shop floor controllers) as a complement.

As to the manner in which the interaction between central and local systems could be studied, there seems to be no choice but a long term study of a few units. The project presented to the sub-contractor was that local teams should be given the largest possible freedom to manage their own activities within the constraints that follow from the fact that the teams are parts of a large scale, automated industrial production process with strong horizontal dependencies between units in the materials flow. The study of how local units solve emerging problems and what information they use should be conducted over a fairly long period of time. Since the task is to generate hypotheses rather than test deductions from existing theory, the choice of sample should be aiming at a moderate variety in settings rather than similarity. Control-

ling independent variables should be a minor concern in comparison with systematic observation without interfering with ongoing learning processes. The research task is similar to that of a natural histogrammer or explorer, collecting items to be described and classified, thereby providing material for emerging theory (Northrop, 1959).

As mentioned above, the sub-contractor was willing to include a project on local management information systems in an ongoing general decentralization program. Three local teams were chosen and the aim of the project was determined to be to generate a model to help local teams to get started on managing their own rationalization and development projects. The model would be one instrument in an all out effort to improve the capability of the organization to absorb and utilize new technology to maintain and improve quality, flexibility, just-in-time-delivery and productivity.

#### SAMPLES FROM THE EMPIRICAL DOMAIN

##### *Central vs local management systems*

The central systems of the sub-contractor measure activities regularly, objectively, uniformly and with high precision on quantitative variables. Comparability with other units, budgets and plans is a key issue. Therefore well-recognized concepts and standards are used. They are computerized and there is a capacity to generate summarized reports quickly. But such systems are not very good at giving reasons why things went wrong or why there is a shortfall in relation to budget figures. They are sure to register all deviations from the normal but there may be several weeks before the reports are available. These systems measure *ex ante* and *ex post* but not "*in itinere*" — underways — except for systems that control the physical flow or technological processes.

Local foremen are of the opinion that the central management accounting system does not give them much support in running their units. First of all reports are late, sometimes up to 8 weeks between action and report. By then

everybody has forgotten about what went wrong and why, and therefore cannot draw any useful conclusions from the figures or for that matter interpret them in any reasonable relation to the work process. The report only shows that a cost center overspent its budget on some accounts but not on what machine, what product, what happened and who did it. There are signals that something went wrong but decisions to rectify have to be based on other sources of knowledge.

The local systems that are used locally in the three units that are included in the case study focus on five factors over which the local team can exert some control. They all relate to accounts for semi-fixed overhead costs. The factors are: machine stoppages, consumption of tools, consumption of indirect materials, maintenance and rejects.

The most important factor is to keep stoppages down. To do that one has to describe and analyse the reasons for stoppages. A machine-line may represent a considerable investment. Capital costs are several thousand dollars a day, while the four operators on a shift together may earn several hundred a day. When there is a stoppage extra overtime is needed to make up and there also are the costs for acute maintenance. Of course, the policy is that maintenance should be planned but the facts are that a very large proportion of maintenance capacity is used to solve acute problems due to stoppages.

Skilled and well-trained operators are increasingly valuable to the company. If machines can be run smoothly, producing high quality goods in due time and in the volumes ordered, results will be well above budget.

Researching how real processes are monitored by the operators and their foremen is time consuming and tedious. It is difficult to observe what is going on in a process of knowledgeable monitoring (Giddens, 1984) of work, which, as we know, includes the continuous reproduction of team cohesion. An outsider has to rely to a large extent on the accounts of episodes given by team members. From those accounts it can be concluded that local teams view the above mentioned five cost items more concretely and more

causally than central managers view their cost figures. Experience tells the foreman that there are thousands of possible causes of disturbances, therefore it is necessary to see with your own eyes and to talk to the people closest to the events. Standard procedures give an interpretative model and the local management problem is to narrow down the number of possible causes to problems and focus attention on the most pressing problem while surrounding procedures are kept at standard. In fact, this seemed to be the main mode of operation of the teams; focus on one problem at a time, take action, determine whether costs have improved, refocus on another problem, etc. In this way learning is continuously built into the standard operating procedures of the team.

The cost reports from the central system signal that something is wrong and, in a crude way, it seems that the subsequent causal analysis is done in segments that coincide with the cost items (accounts). Even if causality often is circular — we have found it useful to talk about vicious and good circles — problem identification and action design starts with the accounts. One disturbance leads to another, and the idea is to break the causal links in vicious circles and, possibly, reinforce good circles.

As an example of this process, let us look at rejects. The sooner in the production process a deficient part is discovered the better. Operators do not like to have other departments downstream complain about sub-standard parts. When a work piece has been damaged in some way it is costly and time consuming to correct, if it is at all possible. Rework creates a loop in the system that is a disturbance, which in turn generates uncertainty and a need for buffers. Zero-rejects is an important goal even if it is secondary to a high quality of output. In order to be able to do anything about rejects it is necessary to keep track of reasons for rejects. It is, however, not easy to know what the cost would be for bringing down the rejection rate from 2% to 1% in a machine group. As a rule, there are rejects at the beginning of every run after a new set up. There might be as many as five rejects before the line is properly trimmed. Just-in-time delivery means

that small batches are sought. With more set-ups there will be more rejects. It is to a large extent the operators that have to find solutions to the problem of having flexibility without rejects!

This kind of simple and somewhat fragmented image of causal relations is what operator accounts convey. When a problem is focussed on that image is complemented with relevant operating statistics and broken down cost items to form the basis for action.

The joint problem awareness of team members and the contribution of bits of a puzzle solution by several team members generates an episode that has high enough "valence" (Vroom, 1964) to trigger changes in standard operating procedures. Without the local mobilization of causal knowledge central information will have little effect on local processes.

### *Three locations*

The research sites are three work units in three different plants (called A-, B- and C-ville). As a whole the sub-contractor company has eight plants and employs about 10,000 people. There are more than 300 foremen in the company. We are studying three of them. Their units are concerned with manufacturing (i.e. not assembly). This is in line with our aim to study automated production processes. The units consist of lines of machines that are coupled through mechanical and electronic means. Most of the production process is controlled by micro-processors and a large number of measures of the product are taken continuously. The measures are displayed on screens at the work stations all around the plant. Since the principal has been doing very well during the last few years, the sub-contractor has been working above normal capacity during that period. However, the units that were included in the study are not among the most stressed. They also had foremen that expressed an interest in working out new routines. The project started in the spring of 1984 and we plan to continue through 1987.

The empirical data that are collected on the three locations tend to cluster around "episodes". This is quite natural since the teams work with problems in projects that are termi-

nated when a satisfactory solution is found and a change in standard procedures achieved. Of course the bulk of the activities that go on in a work unit are routine and a large amount of operating statistics are collected in the course of routinized production. However, the local learning effects that the decentralization efforts are designed to enhance seem to have an episodic character. There also seems to be some dependence between episodes so that a kind of good circle emerges, one victory sets the stage for the next and stimulates a kind of game spirit. There are also instances where teams have relapsed into routine work again and where leaders have not been able to maintain attention. This is a crucial factor — the mobilization of the will to bother about changing something that is not as good as it could be. It is important to get a good start and then to go from project to project finding new challenges.

Every episode in itself is a complex set of causal relations and possibilities. It is quite difficult to document these episodes and from a theoretical point of view they might be found trivial, but it is our firm belief that a distinguishing characteristic of a well managed production organization is its ability to mobilize this kind of learning.

To show how episodes can generate further episodes and how initiatives can spread between work units a sequence of episodes in the A-ville plant is accounted for below.

### *Example 1: A-ville plant, shaft-line*

The team that runs the shaft-line in A-ville is our most successful team and this is the first episode that we recorded in the study.

The line consists of a number of machines organized as illustrated in Fig. 2. First, an operator loads the line with a batch of work pieces. This is done with a lifter. The first turn-machine automatically fetches a new work piece when the earlier one is delivered to the next operation and the work pieces are moved down the line until they are packed for shipment at the end. The operator monitors, loads and shifts tools. There are five to six different tools in use. The team chose as their first project during our study

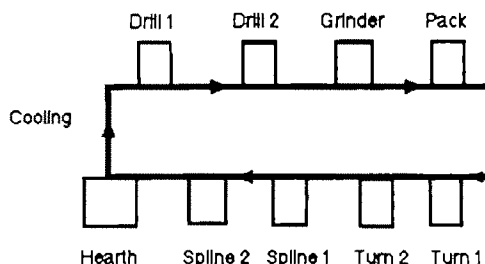


Fig. 2. The shaft-line in A-ville plant.

to do a follow up investigation on tool consumption. It is not the largest cost factor. The "local system" to follow up tool consumption was a piece of paper and pencil at the machines using tools. Operators noted how many shafts had been worked on every time a tool was worn down to the extent that quality measures were effected and the tool had to be exchanged for a new one. Simple and easy. After each shift the foreman registered the data from the slips of paper into their micro-computer and thus produced a graph showing consumption per type of shaft and machine. Actual consumption could be compared to standard according to the cost estimate (and budget).

In Fig. 3  $N$  stands for standard cost and  $V$  for actual in week 12 in 1985. The standard had been exceeded for two tools, the first and the second. In the first operation the team had used 35 tools against a standard of 22. In the second operation 50 had been used instead of an estimated 16. (The proportions in Fig. 3 do not adequately re-

flect these quantities since the figure measures costs.) What was going on? The operators and the foreman together analysed what the reason could be. They scrutinized the operation step by step. Finally they discovered the reason. The part that is processed consists of a shaft with a disc at one end. The joint material between the two parts was too hard for the tool that was used. Either the material had to be softer or a harder tool had to be used. They contacted the supplier of the raw material for the part and learnt that the joint could not be softened without losing quality. Since quality is the prime objective the only thing to do was to get a harder and more expensive tool. After a couple of months the team was back in balance on tools.

This perhaps was not a very dramatic achievement, but if the follow-up had not been done the savings which became possible through using a more expensive tool would never have been discovered. Nobody would ever have asked anything about the increased tool costs. The standard would eventually have been adjusted upwards. The point is not the solution of a specific problem but that observant operators discover problems when they occur and do something about them. There also was the side effect that the team had established a routine for follow ups.

#### Example 2: same plant, same line

Follow-ups have many uses. Before the pro-

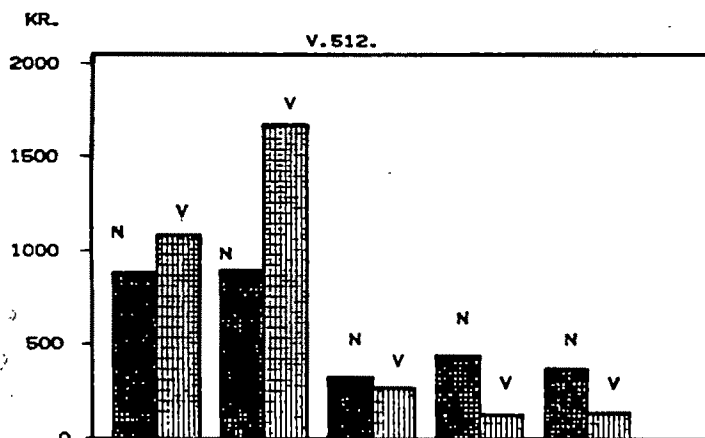


Fig. 3. Actual ( $V$ ) and standard ( $N$ ) use of tools in five machines.

ject started, salesmen for machine-tools would come up to the foreman to test new tools on the line. They had talked to the plant manager and got his permission. It happened quite often. The foreman could not control these tests. He was told by superiors to do them. The team had no interest and did not care about the outcome of tests. The exchange of one tool for another was decided by engineering staff — technicians. The team, was not involved.

Now that the team has a routine for testing tools, for technical and economic performance, they are better prepared when salesmen show up. The situation is reversed. The foreman tells the salesman what tools they are interested in testing. The team use their paper and pen and micro method to produce the data necessary for a decision and then decide whether a new tool is worthwhile or not.

The team did such a test of 5000 pieces in April 1986. It led to a reduction in tool cost per piece by about 50%. The team was convinced by the test that the more expensive tool that was chosen was superior since every tool could do more than twice as many pieces before it had to be shifted. We are talking about a tool cost of 1 cent apiece instead of 2 cents, but we are also talking of mass production over a longer period. The point is that the team has control and can initiate tests. Since they are in charge, they are interested in testing carefully and evaluating the results.

*Example 3: same plant, same line (another follow-up)*

The foreman on the shaft-line saw in his cost report from the central cost accounting system that his cost for indirect materials had gone up a lot during a certain period. He could not explain why. He and the team felt that it had been a quite normal period.

The team initiated a follow-up investigation of consumption materials, day by day during the next period. They found nothing that could explain the over-consumption of the earlier period. After a couple of weeks and intensive discussion they concluded that there must be something wrong with the accounting system. The con-

sumption of oil and cutting-liquid, they had narrowed down the search to these materials, had been quite normal. The figures must be wrong. So they started to dig into the system, checking invoices at the supply department. They found the mistake — a book-keeping error. A shipment of oil had been charged to the shaft-line instead of to supply. The whole plant uses that kind of oil and the units are charged when they take out materials from supply. There had been a mistake! Yes, it would not happen again!

A consequence of this vigilance is a better central system. It becomes more trustworthy. Mistakes are avoided if angry men come charging up the stairs when one is made.

*Example 4: same plant, the drums-line (rejects due to faulty raw material)*

On the drums-line in the A-ville plant (which has the same foreman as the shafts-line) they turn heavy drums inside and outside and make a number of drillholes in them. The line looks like the shafts-line described earlier. The raw material comes from the foundry 50 km away. As can be seen from Fig. 4, rejects due to faulty materials reached a top value of 3% in week 12 (the lower curve shows rejects due to processing faults).

The team discussed what factor caused the extraordinarily high number of rejects. They found that when the machine turned the inside of the drum, the tool carved away too much of the hardened material. Or, to put it another way, the piece that arrived from the foundry had too little material on the inside. Technically it was necessary to turn that much to meet quality standards for the drum. A discussion with the foundry was initiated. It resulted in the foundry putting extra hardened material on the inside of the drum. After some weeks the reject rate stabilized at a lower level.

In this case an operator discovered that the reject rate had increased and initiated a follow-up.

*Example 5: same plant, same line (going through a cost report)*

The foreman goes through the cost report for the first three periods of the year with both



Fig. 4. Rejects in percent due to material (upper) and processing (lower) faults.

*Budget. Per 1-3*

*Avd. 5208*

| Konto  |                     | Jusk.B. | Förbr. | Diff. |   |
|--------|---------------------|---------|--------|-------|---|
| 605-06 | Undervisning.       | 17,1    | 45,9   | -28,8 |   |
| 606-10 | Övertid.            | 7,7     | 8,1    | -0,4  |   |
| 606-20 | Skift.              | 239,4   | 194,1  | +65,3 |   |
| 630-00 | Förbr. Material.    | 113,7   | 139,2  | -25,5 | ✓ |
| 631-00 | Förbr. Verktyg.     | 309,9   | 270,1  | +39,6 |   |
| 662-00 | Underhåll. Mak+EL.  | 136,8   | 204,1  | -67,3 |   |
| 667-00 | Underhåll. Verktyg. | 11,6    | 26,6   | -15,0 |   |

Fig. 5. A summary of the cost report used by the foreman.

shifts. From Fig. 5 one can see that account no. 630-00 Materials was budgeted at 113,700 SEK whilst actual spending had been 137,200 SEK. The difference was 23,500.

The operators discussed the difference for half an hour and then came up with the following three suggestions: (1) Get low-foaming washing powder; (2) Lower the water level in the washing machine; (3) Use only one painting gun instead of two.

The suggestions concerning the washing machine have to do with the fact that all drums have to be washed clean before they are painted.

The present washing procedure is time-consuming and costly. The washing powder that is used foams too much and that causes problems. The foreman was not aware of these problems. The water level in the machine could be lowered immediately, but it took a little longer to change the supplier of washing powder. Small things to correct but valuable to the operators. The suggestion about the painting guns concerns the operation after the washing and the drying of the drums. They are then painted by two painting robots. The operators believe that the robots waste paint, putting more of it in the air than on



the drums. If one robot did the painting with one gun there would be less waste of paint. (Note that men are rationalizing away a robot!)

These examples are intended as illustrations of the often small improvements and changes of procedures that count on the shop floor. The important thing is that an operator sees something and the team or the foreman does something about it almost immediately. This encourages the team to continue to be alert and look for new improvements. There is a "good circle" here! There is also interaction between local systems and central ones through the analyses, follow-ups and discussions of committed teams.

### *Three levels of information*

In their work with their information support, one of the teams has designed what might be called an intermediate level of information between the output-oriented central system and the causally-oriented local system. Thus the ordinary cost accounting system provides an overall view of aggregated cost figures while the local system is used in follow-ups to map causes of deviations from the normal (i.e. the budget). In between these two there is a translation into rough indicators of budget figures for the cost center. These indicators establish the normal in concrete terms.

A local follow-up is necessary only when a controllable cost item seems out of control. As long as the controllable factors keep close to the standards of the key indicators there is no need to worry about them. Rough indicators should lend themselves to showing what is normal for a shift. With three rejected widgets this shift, the team is within budget; with five there is a problem; and with seven something has to be done right away. Most of the time an operator will have a feeling for "the normal", but indicators will help to get started on the process of doing something about it.

### *How to generate norms or key indicators*

Discussions of costs start with the budget. In our teams, operators as well as the foremen are used to assess budgetary concepts. Almost daily they use budgetary concepts and are able to as-

sert their points of view in budget setting sessions and back them up with their own statistics. When they get the production plan for the next year it is fairly simple for them to come up with a realistic expenditure budget. Since they have data to back up their budget they usually get it approved. The final budget will be broken down by periods and key indicators. It is the team that sets the key indicators. They set them and they try to keep them. The shop controller assigned to the teams knows his way around the different databases that have to be used to calculate indicators like how many approved details per hour correspond to the standards of the budget, what is the maximum number of rejects per shift, maximum minutes of stoppage per week, how many widgets per tool on the average, normal set-up time per machine and per line, maximum amount of overtime or extra shift charge that the team can allow themselves if they want to keep the budget, etc.

The pressure to improve costs comes from above in the budget process through a general requirement to improve productivity by  $X\%$  during the next period. The choice of activities to meet this requirement has to be taken at lower levels in the organization.

The final budget for the whole sub-contractor will form the base for transfer prices to the principal. Negotiations with the principal are tough. Overspending will result in losses. It is crucial to make a realistic budget that the "market" will accept and then to keep actual spending within the budget. The budget is based on an estimated mix of products. When the real mix is revealed through customers' orders one still should keep within the budget.

Summarizing, we can see that we are dealing only with five or six controllable accounts in the short run. The teams try to learn how to keep within the budget while producing good quality goods in a flexible way.

## DISCUSSION

The empirical material consists of a large number of episodes like the ones described above

and there are, of course, vast amounts of data on operating performance which are gathered through a number of systems that monitor operations. However, it seems clear that it is in and through these "episodes" that teams learn to manage their own operation and to transfer vital operational information to units upstream of the production flow. Further analysis of the sequence of "episodes" and post-episode performance is therefore necessary.

Generalizing somewhat, we can see that the teams work in projects on their rationalization task in a typical pattern. They focus on one problem at a time, initiate detailed follow-ups, analyse and discuss, and then act. The local information systems that have emerged are temporary ones and they are based on paper and pencil methods (most of the "ordinary" information is available on terminals). Key indicators and diagrams help operators to get a feeling for what is normal, which in turn makes it easier to detect the *ab-normal*. Prompt action when the alarm is sounded invites further exploration of possible improvements.

A striking learning effect is the new demand for operating statistics that emerges. One of the operators said that he had discovered that he had a "short memory". His opinion about how operations were going was largely coloured by the experiences of the last few days. This he had discovered when the team had produced statistics, e.g. over reasons for rejects over a longer period. The recognition of "short memory" leads to a demand for operating statistics. This demand is satisfied by diagrams rather than tables with figures.

Attention is a scarce commodity. In an environment with an overflow of information, attention is an instrument for selection and to limit the information processing demand to manageable proportions. Learning thereby can take place. Furthermore the fact that the team chooses what problem to work with increases the chances that the experience will change behavioural patterns, since salience increases the probability that new associations will appear (Wilson, 1980), "priming" new ways of associating subroutines and interpreting information.

It is quite obvious that this method of learning cannot be introduced by decree from the top. It has to be spread from the teams themselves and probably be supported by incentive systems based on team performance. This raises problems for the unions as to solidarity within the union as a whole. If members become preoccupied with the performance and rewards of their own team they might lose interest in the affairs of the larger group.

Team size should probably not exceed 8–10 persons for social cohesion and commitment to be effective supports of learning processes. Small size, however, makes the group vulnerable. There is a personnel turnover in the teams. In one of the teams, in B-ville, there are only two members that have been members since the start. Therefore it is important that the learning that takes place is organizational learning which is built into practices that carry over to new members. Training new team members is an important source of cost improvement! This underlies the conclusion that the foremen with their greater stability in the team are the focal persons. Not only due to their stability but also because their attitudes to the task are essential to the team spirit that generates commitment.

## CONCLUSION

Methodologically there are obvious weaknesses in the kind of approach presented in this paper, but there is no doubt that important knowledge about cost relations of production processes is located locally. This knowledge is largely tacit and can possibly be uncovered through observation of local action over time. Giddens (1984) builds much of his argument on the assumption that social actors are knowledgeable about the system they act in. Social actors in fact know a great deal about the functioning of the system. If they did not, action would be dysfunctional to a large extent. Johnson & Kaplan (1987) point out that centrally designed cost accounting systems fail to provide relevant information to operational managers. Still the corporations that they

describe are continually successful!

We have the structural principles of the social systems we inhabit in our conceptual frames. We interpret situations and act accordingly. Thereby structures are produced and reproduced. Studies of accounting in action therefore should include the interpretive schema of the actors involved.

To the extent that one can draw conclusions from exploratory material like that presented above, we feel convinced that there are different logics at play in management and operational control. This is not a very original hypothesis to put forward, but if confirmed by empirical evidence, it should cause some rethinking about the expected usefulness of accounting information on the operational level, especially where the operational level is characterized by very sophisticated technology. There is also a general trend to decentralize and decrease the number of hierarchical levels in the large corporations, which account for an ever increasing share of the industrial output in most economies. This means that confrontations between operating and strategic or administrative logics will be more direct than in multilevel organizations and the problem of providing for central and local in-

formation needs becomes more acute. We are convinced that it is not a matter of the locals being taught to think like centrals. One of the engineers we have interviewed said: "In the old days (some 10 years ago) we had the philosophy to design jobs on the shop floor to be as simple as possible. We should be able to take anybody from the street and put him to work minding a machine with the minimum of training. That was wrong then and it is still more wrong today when people won't accept a job unless they feel they are in control, that it is meaningful and valuable." Text book designs of management accounting systems have exclusively been oriented towards decision-making in stable and well-known industrial environments. The research reported above indicates the need to shift focus towards usefulness for learning in the evaluation of systems.

Research is needed urgently and it is difficult to see any alternatives to relatively extended case studies of local problem solving and learning processes. Such studies could possibly be complemented by experiments with new designs of information support. In the latter respect, present information technologies make it possible to conduct such experiments on site.

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## BIBLIOSCENE

## RESEARCH ON BUDGETARY CONTROL IN THE NORDIC COUNTRIES — A SURVEY\*

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### Abstract

The paper surveys research on budgetary controls in the Nordic countries of Denmark, Finland, Norway and Sweden. The aim is to illustrate the types of problems and issues that have provided the basis for research, and to highlight those research studies which reflect research perspectives that have originated in the Nordic area. Influences on research in the area are also considered.

Research on budgeting in the Nordic countries has displayed a certain distinctiveness. For one thing, there is now quite a long tradition of research grounded in behavioural and organizational understandings, in part reflecting the strength of organizational research in the Nordic area and in part, the often applied orientation of the research endeavour. Increasingly, budgeting and other management accounting problems have not been studied in technical isolation, the research inquiries usually being informed by questions of either corporate or public policy. Considerations of actual organizational process and system utilization therefore have been seen as important, as have questions of both pragmatic system design and system implementation. Hardly surprisingly in view of such an emphasis, budgeting research in the Nordic area also has a long history of using detailed case studies, their role for informing our understandings of management accounting in action being recognized well before their more recent rise in fashion ability.

Although there is some growing awareness of Nordic research in this area, not least as a result of the emerging European accounting research

community, a great deal remains relatively little known outside of the area. The main purpose of the present review is therefore to survey the relevant research in the Nordic countries — Denmark, Finland, Norway and Sweden — in order to acquaint researchers in other countries with what has been achieved.<sup>1</sup> More specifically, we wish to show the kind of subjects and problems that have been chosen for research in the Nordic countries and to highlight those research studies reflecting new research thrusts which have originated in one or other of these countries. We also try to show the impact of external influences on such research, as well as influences internal to the research community in the area.

Budgetary control systems have been of particular interest to Nordic researchers. Given that they have been extensively used for many years in a wide variety of organizations and are regarded as one of the accounting methods that have had the greatest impact on behaviour within organizations, this should not be surprising. Nevertheless, in undertaking this survey we still faced a definitional problem: what is budgetary control and how should we delimit this par-

\*The authors would like to thank colleagues in the other Nordic countries for information about research being done. We are also indebted to Anthony Hopwood for improving both the message and the language.

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<sup>1</sup> Many reports are written in English or contain summaries in English. In other cases more information may be obtained directly from the author(s).

tical area from related areas within the broad field of accounting and finance?

In our survey we have opted for a broad approach to the area. Thus we have chosen to consider research that not only focuses on the topic narrowly defined as the formal procedures for making and utilizing budgets and periodic statements of outcomes, but we have also included studies of subjects that are perhaps less closely related to budgetary control *per se* (Hägg *et al.*, 1982). Many different aspects of budgeting are of interest to scholars of budgetary control, e.g. informational, procedural and behavioural. By utilizing a broader definition of budgeting, phenomena and procedures that sometimes are only loosely, but significantly, related to budgetary control have also been included in the remit of our review. So, for example, capital budgeting and certain aspects of finance have been included to the extent that they cast light on the procedures and processes of budgetary control. One topic has been largely excluded, however, namely studies of budgeting in local and central government (see, for example, Jönsson, 1982; Bretschneider, 1982). It was felt that the content of such studies is significantly different from that prevailing in the private sector.

With such a focus, the subsequent review first summarizes some of the trends in international research on budgetary control. The research in each of the Nordic countries is presented, followed by an analysis of how the research is related to both the general trends and the influences from both outside and within the Nordic countries.

#### TRENDS IN INTERNATIONAL RESEARCH IN BUDGETARY CONTROL

It is possible to distinguish three main types of research in budgetary control: procedural, behavioural and social or societal.

The first scholars that engaged in research on the subject of budgetary control in the first half of the 20th Century mainly dealt with its procedural aspects. Most writings during this period

of time were by practitioners, although some scholars engaged in the same kind of "how-to-do-it" writing. Their common goal was the formulating and popularizing of the best budgetary procedures in practice. Slowly, however, other scholars began to question such procedural statements and articles in which these procedures were critically analyzed started to emerge.

The procedures offered for budgetary control became more and more complex as more and more of the budgetary process was discussed by these researchers. More scholars focused on the subject and from the 1950s applied different approaches in their studies (e.g. information economics, agency theory, multiobjective decision theory and mathematical programming). Adopting a normative/analytical orientation, the role of these more critical researchers was to examine the appropriateness of the procedures offered by the earlier researchers. However, empirical methods were also used to ascertain how budgetary control systems were designed in different kinds of situations. The objective of these other studies was to make contingent recommendations for budgetary procedures.

Historically, the second main type of research in budgetary control deals with the behavioural aspects of the budgetary process. The first studies of this kind were made in the 1950s by Argyris (1953) and Simon *et al.* (1954). Both the use of budgets by individual and the effect of budgetary control on people were studied. Since that time many studies have been made using both survey and case study methods as well as laboratory experiments. The findings are, however, still quite fragmentary and coherent theories are lacking.

We have labelled the third main category of research social or societal. The reason for this is that it is concerned with those aspects of the process such as traditions, power and knowledge and their significance in budgetary control. Connections between power in organizations and societal systems are also of relevance from this perspective.

Observations regarding practice have been made by researchers from all the perspectives. Based on their findings and analytical observa-

tions, suggestions have been made for changes in practice, focusing on both the content of budgetary control (e.g. social budgeting) and the processes of budgeting (e.g. increased participation).

In his introduction to the proceedings of the Nordic symposium on "Budgeting and Accounting as Tools for Control", Asztély also observes that as more complications are added to the subject, more disciplines are relevant for its understanding, and thereby for research (Asztély, 1974, p. 10). He explicitly mentions economic theory, management science, computer science and the behavioural sciences (with an emphasis on measurement, communication, decision and information theories).

At the same symposium Widebäck delivered a lecture on research on budgetary control. He observed that at that time the results were characterized by "a relatively small degree of development and especially a small degree of generalization of the schemes, models, theories, etc., that have been used in the studies of budgetary control" (Widebäck, 1974, p. 393). He also stressed our lack of knowledge regarding the effects of the design of budgetary control on, for example, the income of an organization (p. 407).

Although many research reports have been published in the decade or so since that symposium, Widebäck's observations still appear to be valid. More general theories have not appeared.

## RESEARCH IN DENMARK<sup>2</sup>

The Institut for Regnskabsvaesen (Department of Accounting) at the Handelshøjskolen in København (HHK, the Copenhagen School of Economics and Business Administration) has since the 1930s been a centre for accounting research. Palle Hansen was professor at the department from 1953 to 1981 and a leader in the field. He also directed his own institute outside the school, the Instituttet for Lederskab og Løn-somhed (the Institute of Leadership and Profita-

bility), which arranged educational courses and published books and periodicals in the Scandinavian countries and was well known by accounting practitioners in the area.

Hansen developed and advocated a particular view on the economic content of budgeting, which emphasized its role in the co-ordination of activity and related a budgetary view of net revenue and direct costing to the capacity basis of the firm. Much of the work reflected a noticeable U.S. influence and his orientation, like that of many of the procedural writers, was towards improving practice. Indeed, it is noteworthy that in the introduction to the 700 page handbook of budgeting that he edited in 1975 (Hansen, 1975), he characterized the book as being "written by practitioners for practitioners". Although a number of younger researchers from the HHK contributed to the volume, they have subsequently developed more modern control-oriented approaches to budgeting.

Zakken Worre, professor at the Department of Accounting from 1978, continued the procedural work on accounting and budgeting. His descriptive accounting model of the firm was based on a direct costing principle, although it allowed for adaptation to the market conditions and production technology of a particular type of firm. During the 1960s and 1970s Worre published numerous texts intended for practitioners and students. He left the department in 1985 for a top management position in a private firm.

Also during the 1960s Kare Dullum tried to integrate long range corporate modelling with management and operational control. His financial simulation model consisted of cash flow budgeting and a capacity control system based on a number of decentralized but integrated databases. His book of 1974 drew upon the research of Ackoff, Churchman, Demski and Ijiri in the U.S.A., but even with such a more explicit use of theory, Dullum's aim was still focused on improving practice. He also left the academic community, for a career in business in 1974, although such procedural work still continues in the management accounting area.

<sup>2</sup> Preben Melander has contributed valuable advice for this section.



From the late 1970s an interest in the behavioural and social aspects of accounting and information systems developed at the HHK. In fact, in 1978 eight researchers from the Department of Accounting established the Management Control Systems Group from which several empirical studies of the development and use of accounting information systems have emanated. Subsequently the empirical orientation of such research, the critical posture adopted towards the use of traditional accounting methods and the contextual empirical and theoretical studies of the use and development of accounting have all increased the general theoretical orientation of the researchers in the group.

Preben Melander is particularly interested in the role of accounting systems in public sector enterprises. Since 1978 he has conducted empirical research projects in eight institutions using both field studies and action research methods. Starting from a mainly functional socio-technical orientation to development and use studies, he has since developed a more subjective and interpretative stance, paying particular attention to the relevance of theoretical concepts of power, culture, symbol and language. The research conducted from the latter perspective has indicated the non-analytical uses of formal management information systems and the important explanatory role of power relations and parameters of organizational culture (e.g. Melander, 1983, 1986).

Amongst other researchers in the department, Peter Neergaard is interested in the implementation of EDP and accounting systems, utilizing socio-technical and contingency theories. His more recent studies have focussed on the role of EDP in small firms (e.g. Neergaard, 1986). Jan Mouritsen is interested in the social aspects of accounting systems as well as metatheoretical problems in management and financial accounting research. He has participated in a series of empirical studies of accounting systems in practice, not least the British NCB study carried out in collaboration with a group of British researchers. Apart from having published a series of papers in Denmark, internationally he has co-

authored Capps *et al.* (1986) and Hopper *et al.* (1986).

In 1985 the accounting faculty at the Copenhagen School of Economics and Business Administration was reorganized and the group containing the three researchers mentioned above, amongst others, was renamed the Department of Informatics and Management Accounting.

At the same time as Palle Hansen published his profitability models in the 1960s, an independent school of thought in the area of budgeting was continuing to develop at the University of Aarhus under the direction of Vagn Madsen. Madsen had been active there since the early 1950s and the basic principles of his work can be found in Madsen (1959). These were augmented in a number of subsequent works, for details of which see Madsen & Polesie (1981). (For further information on Polesie see the section on Sweden.)

The basis of Madsen's work is "variability accounting". Variability accounting assumes that every cost varies with changes in specific factors and every activity can be attached to an objective. Thus, cost accounts are constructed in three dimensions: objective, responsibility and type of resource. Objective and responsibility are assumed to be basic "variability factors" and the budget should be built on this logic. The Madsen approach has been developed further by Polesie and has been used in Denmark and Sweden as a basis for developing budgeting systems for some private and public companies, as well as for some municipalities.

Madsen's accounting theory has also had a great influence at the Handelshøjskolen in Aarhus (The Department of Accounting at the Aarhus School of Economics and Business Administration). Here, Bent Provstgaard is the leader of a more theoretically oriented school of financial accounting based on analytical and financial theories, with a noticeable U.S. influence.

From the early 1980s an analytical accounting school has existed at the recently established University of Odense. Here, John Christensen presents accounting as part of an economic

analytical subject based on management science and economic theoretical perspectives, with a substantial influence from systems theory and quantitative and analytical methods. The theoretical research tradition is much influenced by U.S. research, especially that at Stanford University.

### SUMMARY

At this moment there seems to be at least four separate accounting "schools" in Denmark with different research intentions, traditions, methods and theoretical orientations:

(1) The Department of Accounting in Copenhagen: analytical, procedural and managerial methods of management accounting with a strong practical orientation.

(2) The Department of Informatics and Management Accounting in Copenhagen: social and behavioural aspects of accounting system use and development with both a theoretical and a practical orientation.

(3) The Department of Accounting in Aarhus: analytical and procedural methods of financial and management accounting with a more theoretical orientation.

(4) The Department of Management Science at the University of Odense: analytical, financial and quantitative methods of general accounting with a strong theoretical orientation.

### RESEARCH IN FINLAND

Within the field of management and financial control, Finnish research was first directed towards investment decisions and financial planning.

At the Helsinki School of Economics, Jaakko Honko has studied investment decisions in Finnish industry since the early 1950s, with some of the publications being co-authored by various research fellows at that institute (Aatto Prihti and Kalervo Virtanen). Investment processes have also been studied by Christian Junnellus (1974) at the Swedish School of Economics and

Business Administration in Helsinki.

Finnish researchers have a strong tradition of normative research using quantitative analysis. Eero Artto and Veikko Jääskeläinen published their dissertations on aspects of a firm's capital structure in the middle 1960s. Artto later investigated cash-based profitability figures (1980, 1981). Jääskeläinen (1972) has used mathematical programming techniques (linear programming, goal programming, etc.) in modelling the control processes of firms. Several other researchers have also used operations research approaches in studying the planning and control process. Some have done so in co-operation with Jääskeläinen (for example, Salmi, 1974), while others have pursued the area on their own (for example, Carlsson (1972) and Näykki (1971), both at the University of Turku, and Laitinen (1981) at the University of Jyväskylä).

One research group at the Helsinki School of Economics has recently studied budgetary control. Alaluusua (1982) investigated the structural determinants of the budgeting process using a contingency approach. His main finding was that "predictability or uncertainty surrounding budgeting . . . and the size of the firm, should be the fulcrums around which the design of a budgetary planning and control process should take place" (Alaluusua, 1982, p. 217). Together with Åberg he is now analyzing the formal control systems in eight Finnish business organizations. Akkanen (1982) used the same contingency approach as Alaluusua in studying follow-up budgetary control processes.

Kalevi Kyläkoski (1980), also a member of this research group, investigated the relationship between the strategic control process and the budgetary control process. He identified a typology consisting of three different types of planning systems: (1) the budget planning type; (2) the emergent strategic planning type; and (3) the multi-dimensional strategic planning type. He found that background factors concerning the susceptibility of the action environment to disturbance, the significance of participant groups and the stage of corporate development affected the type of planning system needed in a company.

In Turku, Kari Lukka (1985) is studying the tactical aspects of budgeting and is especially trying to develop a more general model of the factors leading to intentional biasing. The framework designed was successfully used in explaining observed budgetary biasing. Budgetary slack was found to be more usual than upward-biasing.

At the Swedish School of Economics and Business Administration Bo-Göran Ekholm (1983) has developed conceptual models of management control. One aspect of his investigation that is related to the current tendency to divisionalize companies in his concern to clearly separate the operational responsibility of a division from a central financing activity and to design financial measures accordingly.

### Summary

Research in Finland has reflected a broad based and academic orientation. While the early researchers were concerned with financial models and rising operations research techniques, recent researchers have expanded this focus to include behavioural questions and more traditional budgetary topics. This includes both areas such as biasing of estimates in the budget process and links between budgetary planning and strategic planning.

### RESEARCH IN NORWAY

At the seminar on "Budgeting and Accounting as Tools for Control" held in Kungälv in 1974 (Asztely, 1974), two Norwegian papers were presented. Arne Riise (1974) presented one on the "Value of information — aspects regarding alternative, additional information" and Gunnar Arhold (1974), one on "Budgets — tools for auditing, object for auditing or management service."

Riise's paper focused on issues of information economics and was an example of analytical and theoretical research in the field of budgetary control. This kind of research in budgetary control has continued in Norway. An example is Riise's doctoral thesis (1978). Research in the agency theory tradition has also been done

(Gjesdal, 1982).

Arholt, in contrast, dealt with the auditor's role in relation to budgets and financial forecasts. He suggested that if budgets and financial forecasts are published as part of a company's official statements, they should be audited by the external auditor. The paper was a first draft of a report from an empirical investigation.

Empirical research on financial control in large as well as smaller Norwegian companies has also been conducted by Kinserdal *et al.* (1980). Both on an empirical and theoretical basis, they have tried to see whether it is possible to identify specific needs and requirements that affect the design of budgetary control systems in the smaller firm. From their theoretical analysis they conclude that there are no such requirements. This conclusion is supported by their empirical study in a number of companies in one geographical area of Norway.

The political scientist Johan P. Olsen has studied the character of the budgeting process and budgetary control in practice. In a famous article (1970) he discussed several roles for budgetary control other than its traditional role as a tool for decision-making and planning. Basing his analysis on data gathered in a case study of budgeting in a Norwegian commune, he contended that the data could only be understood if the budgetary process was looked upon as a ritual or ceremony rather than a rational decision-making process. Laegreid & Olsen (1978) went on to study decision processes in governmental authorities in Norway using perspectives from organizational theory and sociology.

Another area of research that has attracted some attention in Norway is budget simulations and the study of the impact of computers and computer science on the budget process. Stabell (1981) studied information systems as aids in management decision-making and he has also investigated the financial and organizational effects of computer technology on organizations (Stabell, 1980). Moreover, at the Institute of Administrative Data Processing at the Norwegian School of Economics Leif B. Methlie (1979) has directed a project on computer-aided decision-making. Together with Haakon Ringdahl, he has

analysed important factors in developing computerized decision support systems and developed a prototype budgeting system as an example of a decision support system.

### *Summary*

Compared to the other Nordic countries, research on budgeting in Norway has not been as comprehensive. The most noteworthy contributions lie in the research done from organizational and sociological perspectives.

## RESEARCH IN SWEDEN

Eva Wallerstedt surveyed early writings in Sweden on budgetary control (1981). These writers were practitioners and they described the advantages and the technical design of budgetary control systems. Thus, they could be classified as belonging to the procedural school.

The first writings by scholars also dealt with procedural aspects of the design of budgetary control systems (Schybergson, 1936) and with their conceptual basis (Svennilsson, 1938). Frenckner (1953), for example, posed many questions regarding the design of budgetary control systems.

Later, however, Albert Danielsson (1963) published his thesis in which he advocated and developed a scientific approach to the measurement and analysis of standard costs. These activities were seen as being analogous to those of an experiment in the natural sciences.

Another methodological approach was chosen by Göran Widebäck, who described and explained the role and function of budgetary control primarily as it affects the capacity of the organization to solve problems (1966, 1970). His main idea was that budgeting functions as a catalyst in increasing the problem-solving capacity in an organization. The effectiveness of budgeting may therefore be judged by comparing the value of this increased capacity with the costs and other negative effects of budgetary control. Later Widebäck studied budgetary control in local governments. Several other Swedish scholars have also worked on this subject, for

example, Borgenhammar, Goldberg, Jönsson, Olsson and Polesie. However, their findings in the public sector will not be surveyed in this paper.

Also emphasizing the problem-solving roles of budgeting, Polesie (1976) (also see under Denmark) developed Madsen's idea of variability accounting and pursued its practical implementation in a number of sites. Subsequently, a number of doctoral students have continued this tradition of research under his direction (see, for example, Olsson, 1983). As noted earlier, these papers, like the work of Madsen, focus on the ability to relate costs to variability factors and organizational objectives.

From a quite different perspective, in 1968–1975 a research group at the Stockholm School of Economics developed a conceptual framework of budgetary control and empirically studied budgeting and budget follow-up processes in a number of organizations. The conceptual framework underlying these studies was summarized by Samuelson (1973). The budgeting process was investigated by Bergstrand (1973, 1974) and the follow-up process was investigated by Magnusson (1974). A fourth member of the group, Peter Gavatin, studied budget simulation (1975).

Two of the members of this group, Magnusson and Samuelson, have together with Hägg continued doing research in budgeting. The approach chosen was of a combined contingency and behavioural nature and a case-study approach was used (1982). This study is available in English and reflects a synthesis of a significant research thrust.

A survey of theory and practice in business economic planning was published in 1976 by Eliasson. He also made a comparison between practice in U.S. and European companies. He found that comprehensive planning is an instrument of internal two-way communication and top-down control rather than a pure planning tool. Planning in the U.S. was found to utilize an efficient reporting and control apparatus at corporate headquarters that reviewed preliminary plans at earlier stages than their European counterparts. In 1984, Eliasson edited a book in

Swedish building on the previous one in which the possibilities for increasing planning efficiency with computer systems were explored.

Behavioural aspects of financial control systems have been studied empirically by Östman (1973, 1977). He summarizes his findings in a model of behavioural accounting (1980) and also applies this model to a discussion of the design of financial control systems in an inflationary context. According to Östman's model, the use of accounting measures may have different effects in an organization. The measurements chosen by a particular organization may effect the decision alternatives that are investigated and also the decision taken. In Östman's terms, the measures are said to have an impact on the financial focus of the organization. Also the value of a measure may have such an impact. The alternatives studied are seen as dependent on attributes such as attitudes and knowledge of the actors involved. The impact of inflation on budgetary control has also been treated by Hägg (1976) and Näslund (1978).

Other aspects of budgetary control were also studied during these years. The implications for budgetary control of the theories of multiobjective decision-making were analyzed by Olve (1977). Wider human and organizational impacts on budgeting and other control systems were stressed by scholars in Gothenburg (Hedberg, 1970; Hedberg *et al.*, 1971). A major contribution to the view of budgeting (as well as information) systems is found in the work of Hedberg. The research dealt primarily with organizations in changing environments. Together with Jönsson he wrote "Designing semi-confusing information systems for organizations in changing environments" (1978). This paper interjected into the budgeting literature the then controversial notion that an information or budgeting system actually might desire less than perfect historical data.

At the University of Lund research has focused on presenting theoretical frameworks for planning systems. This research has taken a very broad view of the planning process. Three studies typify this research. Arwidi (1974) published his thesis on planning and simulation in

which budgeting is seen as planning on one out of three levels. The framework of Malm (1975) is directed towards strategic planning systems. His general approach is, however, also of relevance for budgeting as well as for other planning systems. In a model presented by Olofsson (1976) of the design of financial control systems, budgetary control is one major subsystem.

Capital budgeting practices in Swedish firms have been studied by several researchers. Hägg undertook an empirical study of the post-decision review of capital investments (1976). Thereafter, Persson conducted an empirical study of the investment behaviour of some companies with regard to government actions (1980). Renck conducted a survey of capital budgeting in companies (1966) and Tell (1978) repeated this survey. The results seem to be similar to those reached in several other countries. Payback period was the criteria most frequently used, although the use of discounted values and similar criteria has increased. There also seems to be an increase in the extent to which systematic consideration is given to measuring the effects upon chosen criteria of changes in the assumptions underlying the investment. This was interpreted as an adaption to an increased degree of uncertainty between the times of the investigations.

Gandemo has made empirical studies of capital investments in large companies for the Swedish Industrial Board (1983). Among other things he found an increase in intangible and financial investments as compared to capital investments. Somewhat surprisingly, this was found to decrease organizational flexibility as the new resources acquired (mainly specialists) were more difficult to divest than traditional tangible investments.

Cash planning has received attention from researchers using a variety of tools. A descriptive model of the cash budgeting process has been developed by Elmgren-Warberg (1972), while Andersson & Bjerke (1971) developed a computerized model for the planning of cash-streams in a bank. Kedner worked out a model for optimal cash planning by a firm (1967).

### *Summary*

In general, the Swedish tradition in budgetary research has been oriented towards both the study of practice (empirical) and the generalization of these findings into models and/or procedures intended to facilitate the budgeting process. Overall the behavioural tradition among the Swedish researchers is quite strong.

### EXTERNAL INFLUENCES ON NORDIC RESEARCH IN BUDGETARY CONTROL

The evolution of research in budgetary control in the Nordic countries appears to follow the same pattern as elsewhere. For example, behavioural and contingency studies were first made by researchers in the U.S. and in Great Britain. After a delay of several years, studies of this kind were also undertaken in the Nordic countries.

The variables used in these studies in the Nordic countries seem to be similar to those found in other countries. With regard to methodologies, however, a difference may be noted. In the Nordic countries case studies are most frequently used (in behavioural and contingency studies), while in the U.S. surveys and experiments have been used to a much greater extent. This would suggest an important source of potential synergy among the researchers in the different countries.

One Nordic contribution seems to originate primarily from within the Nordic countries, namely budgetary control with objectives for the use of resources (the Madsen School). When formulating this model, Madsen was, of course, influenced by other models and concepts. For example, he refers frequently to Goetz and it has been noted that Schneider (1945) has described a system similar to that of Madsen. But the design, presentation and use of the model may be conceived to be a particular Nordic contribution to the research on budgetary control.

A second Nordic thrust is the work noted earlier on semi-confusing information systems (Hedberg & Jönsson, 1978). This orientation is quite different than much of the normative and

analytical found, for example, in the works of North American researchers such as Demski, Ijiri and Feltham and behavioural researchers such as Mock and Stedry, to note a few.

### INFLUENCES WITHIN THE NORDIC COUNTRIES

Nordic research has benefited from interactions among researchers in the Nordic countries. One cooperation of note is the joint work of Madsen and researchers in Gothenburg (Asztely, Polesie and others). Through this cooperation, the theoretical method introduced by Madsen in Denmark has been supplemented by empirical studies.

Another example of inter-Nordic country research is the use by a Finnish research group (Akkanen, Alaluusua, Kaiju and Kyläkoski) of the frame of reference developed by a research group at the Stockholm School of Economics (Bergstrand, Gavatin, Magnusson and Samuelson).

Another source of such cooperation is the direct personnel contacts possible within the areas. Erik Johnsen of Copenhagen has, for example, influenced several research reports from the University of Lund in the southern part of Sweden.

### IMPACTS OF RESEARCH ON PRACTICE OF BUDGETARY CONTROL

Budgetary control is an instrument which is widely used in organizations. Since one objective of budgetary research may be to affect practice, findings regarding budgetary control may be evaluated with regard to their impacts on practice. Although no broad investigations on this subject seem to have been made, a few remarks are nonetheless appropriate.

The Madsen school of researchers have implemented their approach in firms and other organizations in both Denmark and Sweden. In Sweden companies tend to be very open and willing to be part of often time-consuming research

projects and it can be assumed that such personal interaction can influence the development of budgeting. Hägg *et al.* (1982) to some extent used an action-research approach and in this way had some influence on practitioners. Several other behavioural studies have been conducted in Swedish companies and in close and open contact with the personnel in accounting and budgeting departments. It is reasonable to assume that such projects had an impact on the firms serving as research sites.

Influence on practice can also be indirect in nature. Concepts and models included in textbooks and used in other ways in education and training, may later be implemented in organizations by those educated and trained in university environments. The ascertaining of the extent of the synergy awaits empirical study, however.

### CONCLUDING COMMENTS

Nordic research on budgeting is closely connected to international — though almost exclusively to Anglo-Saxon — research. While we can find some axiomatic and analytical work, more of the Nordic work is "softer" in nature. It focuses on conceptualizing and framework building. Indeed the research results can be characterized in terms of the development of

concepts and frameworks. The fact that this work has often been connected to perceived practical problems in industry and has sometimes been performed in close cooperation with companies, may explain this focus. The case study approach has frequently been used — sometimes in a somewhat "loose" way. However, even if there is some interaction between Nordic researchers, it can be argued that the main influences appears to have come from Anglo-Saxon research.

Nordic research is often done in small research communities, i.e. at universities or institutes within such universities where the main part of the work consists of dissertation work by doctoral students. The results of these research efforts usually are published only in the national language. Little is published in the international journals. Only two notable exceptions exist. Some behavioural papers have appeared in this journal and elements of the limited agency research in Nordic countries have appeared in the *Journal of Accounting Research*.

We, however, believe that the fact that the Nordic budgeting research is conducted in a specific cultural (in the broad sense of the word) context and is often empirically oriented should have relevance for increasing our understanding of budgeting and thus be of interest in the development of more general theories in the area.

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## THE SEEKING OF ACCOUNTING WHERE IT IS NOT: TOWARDS A THEORY OF NON-ACCOUNTING IN ORGANIZATIONAL SETTINGS\*

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### Abstract

Accounting researchers are preoccupied with the study of extant accounting systems with the result that they do not question situations where an accounting system is expected to be in operation but is not. The investigation of such voids is likely to greatly enhance the understanding of the nature and function of accounting, both in its presence and in its absence.

Thirty spokes are made one by holes in a hub  
Together with the vacancies between them,  
They comprise a wheel;  
The use of clay in moulding pitchers  
Comes from the hollow of its absence;  
Doors, windows in a house  
Are used for their emptiness;  
Thus we are helped by what is not  
To use what is.

(Lao Tzu).

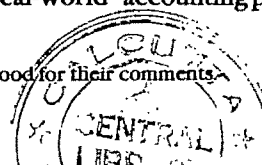
Accounting in organizations is not all-pervasive. While the development and transformation of organizational accounting has been analyzed from a historical (Johnson, 1983; Kaplan, 1984) and from an archaeological perspective (Hopwood, 1987), little attention has been directed towards the instances of accounting *absence*, that is, where accounting was expected but is not. Such a focus would seek to establish the conditions in which particular forms of organizational accounting *do not exist*, and, subsequently, the reasons why accounting does or does not make the transition from non-being to being. In other words, it is necessary to ask: Why

is there no accounting here? What are the characteristics of this accounting-less environment? The analysis involved in answering these questions needs to be undertaken at two levels. The first level of analysis should seek to establish the social, psychological and technical conditions that preclude or do not encourage the presence of accounting. The second level of analysis should concern itself with the researcher's ideological framework that may interfere with the recognition of accounting voids. These two issues are addressed in the subsequent discussion.

### THE SUBSTANCE AND ELUSIVENESS OF ABSENCE

Accounting researchers appear to be preoccupied with accounting presence. The literature is replete with "discoveries" of accounting — normative discoveries of accounting solutions to problems (real or imagined), positive discoveries of "real-world" accounting phenomena.

\*The author is indebted to David Solomons, Roger Hopkins and Anthony Hopwood for their comments.



They observe the existence of budgetary systems, of standard costing procedures, of transfer pricing mechanisms, and convince themselves of the everywhere-ness of accounting. This is a non-discriminating view of reality. Accounting in the form of systems and procedures develops, changes, sometimes is and sometimes *is not*.

Like the Holmesian dog that did not bark, the absence of accounting may tell researchers a lot about the nature of accounting and its existence. The aim of knowledge is not only to systematize that which exists but also to rationalize that which does not. By investigating examples of accounting absence and explaining accounting's non-pervasiveness, it might be possible to create a dialectic between the existing and non-existing accounting worlds and thereby achieve a deeper understanding of the nature of accounting.

Absence is often used as a cue for investigation and as a subject of study in many areas of research. The observation of the infrequency (absence) of colon cancer among certain primitive African societies has led nutrition researchers to discover the beneficial role of dietary fibre. While, in general, in experimental research the treatment constitutes the presence of a factor of interest, nutrition researchers also experimentally induce deficiency (absence) of presumed nutrients (e.g. vitamins and minerals) in a subject's diet to establish the utility of such substances. Fleming's serendipitous discovery of penicillin was instigated by the absence of bacterial growth in some parts of the laboratory culture. In some disciplines, certain types of absences have attained significance as phenomena worthy of study in their own right (rather than as counterparts to presence), for example: poverty (absence of wealth) and deviance (absence of conformity) in sociology; negligence (absence of care) in law; amnesia (absence of memory) in psychiatry, a free market (absence of regulation) in economics, and so on.

In organizational science, various types of absences have triggered a number of concepts and theories: the garbage-can model (absence of rational decision processes; Cohen *et al.*, 1972), loose coupling (absence of tight linkages; Weick,

1976), enactment (absence of a unique, objective environment; Weick, 1977), symbolism and ceremony (absence of literal or substantive content or meaning; Feldman & March, 1981). Hackman's (1984) case study of People Express Airlines focuses on the absence of transitions. Armed with expectations based on Greiner's (1972) model of organizational "crises" occasioned by growth, Hackman searched for and found no signs of significant transitions during the first two and half years of the firm's life. His concluding questions, regardless of the historical determination of this particular case, provide a glimpse of the potential richness of absence research (p. 59):

So what have we here? An organization that has merely put off its inevitable transition for a time — and will pay the price for it later? Or one that managed to get through its period of vulnerability to transitional processes relatively unscathed by them? Or one that is transcending the conventional dynamics of organizational growth and development? Or is there yet another way of understanding the absence of significant transitions at People Express, one that has eluded this observer?

Organizational non-happenings also provide important signals to members. For instance, just as the chief executive's actions, comments and emphases, both public and within the firm, operate as indicators of corporate intent (Peters, 1978), the omissions — what is not done, not said, and not emphasized — are similarly informative.

In everyday situations as much as in research, absence contains information. It is the context, the background, the milieu that gives absence its significance — as Bateson (1979, pp. 46–47) observes:

... zero, the complete absence of any indicative event, can be a message... The letter you do not write, the apology you do not offer, the food you do not put out for the cat — all these can be sufficient and effective messages because zero, *in context* can be meaningful; and it is the recipient of the message who creates the context... The recipient must be, in some sense, ready for the appropriate discovery when it comes. (Emphases in original.)

For recipient *researchers*, however, for reasons explained in the next section, readiness requires a much more acute and self-reflective stance than Bateson suggests.



While sensitivity to absences is a pre-requisite, there is also the danger of over-recognition of absence. Consider the Queen's response to Hamlet's enquiry as to whether she can see the ghost.

Hamlet: Do you see nothing at all?

Queen: Nothing at all; yet all that is I see.

Although the latter assertion in the Queen's reply is necessary to validate the former claim, she could never be sure of its truth. Similarly, the confirmation of accounting absence involves not only the examination of a wider domain ("all that is") but also the risk of overlooking inconspicuous instances of accounting presence.

Thus research into the study of accounting absence must tread a precarious path between under- and over-sensitivity. Mere external vigilance, however, is unlikely to be enough given the researcher's vulnerability to a form of self-deception discussed in the next section.

#### DISCONFIRMATION AND ABSENCE

The concern of the accounting researcher in studying organizations should be to understand and explain what is not happening as well as what is. It is now almost trite to suggest that observations and descriptions are value laden (Hanson, 1958; Gergen, 1978) as perception is itself a pre-structuring and organizing process (Niesser, 1976). All the same, it needs emphasizing that only against a backdrop of a preconceived set of expectations can non-events be recognized. Webb & Weick (1979, pp. 214–215) note:

Expectancies are the controls of both commonsense and science; surprise is an indicator of the abuse of expectancies. What people don't do, who isn't in a network, practices that weren't made, are data and they become data because of the *a priori* expectancies that existed. . . To

identify an omission and to judge its significance is to have an elaborated set of expectancies readily at hand.

Culture researchers, too, use investigator surprise to uncover cultural assumptions of their societal (Mead, 1970) and organizational (Schein, 1985, p. 114) subjects.

The ideological anchoring of prior expectations, however, is two-edged. While researchers may recognize an absence of accounting because a presence was expected (accounting had failed to "clock in"), they may also disregard the anomalous non-presence and preserve their belief in accounting's ubiquity. Herein lies an interesting paradox. "Anomaly" as Kuhn (1970, p. 65) has said, "appears only against the background provided by the paradigm". Thus, if there is not a paradigm comprising prior expectations to throw the novelty into sharp relief as an anomaly, none will be seen. Yet it is the very existence of the paradigm that may stand in the way of discovery.

The proclivity of researchers to systematically ignore disconfirmatory evidence has often been addressed in the philosophy of science literature. Kuhn (1970) suggests that scientists engaged in normal (as opposed to revolutionary) science are reluctant to reject established theories that are challenged by empirical data. Lakatos (1970), who differed with Kuhn on some important issues, similarly observes that researchers tend to adhere to theories in the face of negative evidence.<sup>1</sup> Scientific results and theories also possess a "folk dimension" (Brannigan, 1981, pp. 144–145) inasmuch that those that are socially palatable tend to be accepted at face value and are not subjected to the same level of scrutiny as are the more discomfiting ideas. The susceptibility of experimental researchers in psychology to confirmation bias has been noted by McGuire (1973, 1983) and by Skinner (1959).<sup>2</sup> Evidence of belief adherence

<sup>1</sup>Lakatos (1970, pp. 100–101) illustrates this point using the hypothetical example of a scientist attempting to explain the apparent deviation of a planet from the path predicted by theory by positing various excuses and refusing to re-evaluate his or her earlier theory.

<sup>2</sup>Skinner (1959, p. 378) says: "I remember the rage I used to feel when a prediction went awry. I could have shouted at the subjects of my experiments, 'Behave, damn you, behave as you ought!' Eventually I realized that the subjects were always right. They always behave as they ought. It was I who had made a wrong prediction."

and inflexibility among Apollo Mission scientists caused Mitroff (1974) to conclude that scientists are not the open-minded, unbiased searchers of Truth as lay people would tend to believe. Accounting, too, has its "folk dimensions", tenaciously held beliefs and dogmas that determine what researchers do or do not subject to sceptical enquiry.<sup>3</sup>

While observation may or may not be consistent with theory or established beliefs, the researcher may or may not recognize inconsistency when it does occur. There are, therefore, four possible researcher responses depending on how observation is categorized relative to the relevant theory. Table 1 summarises the relationship between observation, anomaly and

TABLE 1. Theory and anomaly

| Categorization of observation | Relationship of observation to theory |                                             |
|-------------------------------|---------------------------------------|---------------------------------------------|
|                               | Consistent                            | Inconsistent                                |
| As an anomaly                 | 1. False labelling as "anomaly"       | 2. Disconfirmation of theory                |
| Not as an anomaly             | 3. Confirmation of theory             | 4. Failure to recognize challenge to theory |

theory. When the researcher categorizes an observation as anomalous when, in reality, it is consistent with theory, there is a labelling error (cell 1). If, however, the observation does not conform with theoretical expectations, *and* the researcher recognizes the anomaly, an instance of theory disconfirmation is recorded (cell 2). When an observation is deemed, correctly, to be consistent with theory, and hence as non-anomalous, the theory is confirmed (cell 3). Finally, the cognitive "omission", discussed above,

occurs when the researcher, mistakenly, perceives no anomaly, thereby failing to acknowledge that the theory has been challenged (cell 4). The intensity and commitment with which accounting presence is studied tend to generate a momentum that makes researchers particularly vulnerable to cell 4 type of error whereby they fail to recognize and investigate instances of accounting absence.

The implication of the above discussion for researchers studying organizational accounting is that they will need to be aware of their ideological and cognitive biases towards the confirmation of accounting presence. This self-knowledge will make them particularly alert to occurrences of accounting absence, admittedly noticed against a backdrop of theory-based preconceptions, that will stimulate investigation of the socio-technical milieu in which it occurs. They will ask themselves: "Why do we find no accounting here?" The answer is likely to be embedded in not merely the technical but in the shared meanings and socio-culturally constructed realities of organizational participants.

The investigation of accounting absence may be approached from two distinct perspectives — negatively, as the antithesis of presence and positively, as a phenomenon in its own right.<sup>4</sup> These are tentatively proposed and explored below.

#### ABSENCE AS PATHOLOGICAL NON-PRESENCE

One approach to the study of accounting absence is to view it as the pathological counterpart to accounting presence. Thus, the researcher expecting to find a particular account-

<sup>3</sup>Cognitive psychologists have also taken a particular interest in the confirmation bias syndrome and have analyzed it from diverse perspectives. Specific explanations for the syndrome have been sought in a range of cognitive processes: prototype matching (Cantor & Mischel, 1979; Wyer & Srull, 1980), script processing (Abelson, 1981), representativeness and availability heuristics (Tversky & Kahneman, 1974), belief perseverance (Lord *et al.*, 1979), and commitment to prior choice (Staw, 1976).

<sup>4</sup>A third perspective, not discussed in this paper, is to view accounting absence as a transitional phase in the early stages of the life cycle of the firm when the emphasis is on creativity, flexibility and human resource development — these being followed by a formalization and control phase when accounting systems come into their own (see Quinn & Cameron, 1983). Being transitional (temporary) and an accident of history, this type of absence is not of particular interest within the framework of this paper.

ing system in operation, would express surprise at not finding it in place, assume that this was due to some failure on the part of management, and attempt to explain the reasons for such failure. Although some may consider this to be a presumptuous interpretation of absence, it does hold prescriptive value if handled with sensitivity. As this type of absence is actively pursued and "rectified" within the established aims of applied accounting research (Choudhury, 1986), only a brief discussion is undertaken here.

It is possible to offer a taxonomy of accounting absence from this perspective: need-based, awareness-based or possibility-based. A need-based interpretation of accounting absence relates to the situation where the researcher has, based on his or her understanding of the observed's goals, felt accounting to be necessary, but the observed deemed it was not required. Where the observed fails to draw on the extant stock of accounting knowledge because of ignorance of its existence or potential, the void is awareness-based. On the other hand, possibility-based absence refers to situations where the observed considers that, given the constraints faced, it is not feasible on economic, political or other grounds, to adopt a particular form of accounting. In this case, there is a basic disagreement between the researcher and the observed as to the costs and benefits (broadly defined) of accounting presence. The taxonomy as described above is comprehensive inasmuch that it embraces the three facets of social theory — what ought to be, what is and what can be (Therborn, 1980, p. 18).

#### ABSENCE AS VIRTUE

A second approach to the study of accounting absence, and the one that appears to hold considerable research promise, is to attempt to seek out instances of absence that are the result of conscious decision and action (inaction?) by management. Like the lacemaker who strings in emptiness as an essential and integral part of the pattern, management may deliberately build in

accounting voids as part of its strategic design for the organization. Three examples of such "virtuous" absence are explored below.

#### *Absence as trust*

Inasmuch that explicit and formal accounting systems displace human linkages, organizations that foster trust (Deutsch, 1973; Zand, 1972) in hierarchical relationships may find it unnecessary and indeed counterproductive to install certain forms of accounting control systems. For example, in clan types of organizations, which appear to depend more on personal relationships than on formal systems, trust has a critical role to play (Ouchi, 1983). Deal & Kennedy (1982, p. 141) also note that "symbolic" (culture-oriented) managers place a high level of trust in their fellow employees. A manager extends trust in subordinates by allowing them to analyze problems, collect information or implement decisions without recourse to control or policing mechanisms to protect himself or herself. On the other hand, the manager shows trust in his or her superior if he or she is willing to disclose information that may be detrimental to his or her own interests. Given such dynamics, an interesting paradox emerges in the relationship between the level of trust and the amount of information flowing from subordinate to superior. Whereas trust leads to more candour and honesty in dealings (Zand, 1972; McGregor, 1967, pp. 163–164), resulting in more and accurate information transmission, it also reduces the need for, and alters the nature of, certain types of control information.

An important property of trust is that it evokes reciprocation from the trustee in the form of greater trust and commitment. Thus, management may use the absence of inspection and control systems, with some attendant ceremony if necessary, to generate commitment and trust in subordinates. Trust and commitment, however, may sometimes manifest itself as pathological (Golembiewski & McConkie, 1975, p. 138; Staw, 1976; Salancik, 1977, p. 43) — in the sense that trust is extended to undeserving individuals or in unwarranted situations to alleviate "social uncertainty" (Zand, 1972) perceived by the trus-

tor, or that commitment inhibits learning and adaptability. Even so, in general, as human bonds, trust and commitment draw on the inner resources of people and generate more flexibility and resilience than the systems they replace (see Walton, 1985, for a recommended shift from a "control" to a "commitment" strategy).

#### *Absence as constructive ambivalence*

Organizations facing a changing environment or pursuing an innovation strategy need to be flexible and adaptive. The existence of formalized and long-standing information systems, particularly if they have been successful in the past, contribute to rigidity and insularity (Hedberg, 1981). For instance, innovative firms, as Kaplan (1984, p. 98) observes, which compete on novel products rather than on price and cost minimization, would find cost accounting systems that emphasize efficiency and productivity unduly constraining. On the other hand, the absence of particular accounting systems may alert managers to the need to respond to change with imagination and inspiration. Unshackled by history, tradition — "the way we did things" — and yesterday's data, managers might engage in experimentation and creative efforts that will propel the organization in ways that are consonant with its dynamic environment. The deliberate building in of absence goes a step further than Hedberg *et al.*'s (1976) prescription for promoting flexibility by erecting organizational "tents" instead of "palaces".<sup>5</sup> It suggests (continuing with Hedberg *et al.*'s metaphor) that even a tent may prove too restrictive in terms of requiring an appropriate terrain, pitching skills and a commitment to transportation. Instead, it may be preferable to deliberately remain exposed to the environment, to feel its pulse in raw form, to seek, if necessary, appropriate natural shelters — the tree, the ditch or the cave — and abandon these without a thought when it is time to move on. "Semi-confusing" (self-designing) information systems (Hedberg & Jonsson,

1978), although stimulating some flexibility, may still be too structured and constraining for managers who may feel obliged to utilize them purely because they are available. It may be more appropriate to honestly admit ambivalence in the face of uncertainty and present managers with a *tabula rasa* that will stimulate search and encourage improvisation.

#### *Absence as symbol*

Accounting as part of a wider administrative system often plays a symbolic role in organizations (Hayes, 1983; Pfeffer, 1981; Feldman & March, 1981). Budgets may be symbolic of forward thinking, profit centres of individual autonomy and self-determination, cost allocation of corporate belonging, budgetary participation of organizational democracy. The very act of gathering and analyzing accounting information may be symbolic of the much celebrated pursuit of rationality (Feldman & March, 1981) the appearance of which "legitimizes the organization in the environment it faces, deflects criticism and ensures a steady flow of resources into the organization" (Weick, 1985, p. 110). More generally, much of organizational structure including accounting systems may be intended to play a ceremonial role (Meyer & Rowan, 1977). In these examples, and one can think of many others, the symbolism is embedded in accounting presence.

There may be symbolic content in absence as well. Remember Banquo's empty chair? Just as flying a flag is symbolic of allegiance and support, not flying one signifies dissension, as many Austrians discovered to their cost during the Nazi occupation. In the business world, not all organizations find it necessary or desirable to create a facade of rationality for external consumption. Instead, management may use the absence of particular types of accounting systems to send unequivocal signals to both its internal and external constituents of its desire to submit the organization's performance to genuine mar-

<sup>5</sup>Hedberg *et al.* (1976, p. 45) state: "Residents of changing environments need a tent. An organizational tent places greater emphasis on flexibility, creativity, immediacy and initiative than on authority, clarity, decisiveness or responsiveness; and an organizational tent neither asks for harmony between the activities of different organizational components, nor asks that today's behavior resemble yesterday's or tomorrow's."

ket tests rather than to engage in resource consuming ceremony. Such a possibility may be read into the main theme in Boland & Pondy (1983) as summarized by Meyer (1983, p. 238):

... if accounting systems make up the myths of the modern organizational world, and if they are required legitimization bases, then it makes sense that their disruption [absence] is a main source of [beneficial] disorder and change.

Much of the organizational literature treats the recognition and interpretation of symbols and symbolic activities as unproblematic. A great many questions, however, remain unasked and unanswered.<sup>6</sup> Given that a symbol, in its barest essentials, is something that stands for something else (Firth, 1973, p. 26), one is led to enquire: "To whom does  $x$  mean  $y$ ?" As symbols and symbolic activities are recognized as a *difference-in-a-background* in contrast with what is literal or substantive, they too, like the recognition of accounting absence, are grounded in theoretically or culturally inculcated preconceptions. From the researcher's perspective the study of symbolism, therefore, poses the problem that what may appear symbolic to him or her may be transparent and literal to another. Thus while the interpretation of particular accounting-related activities, procedures or artifacts as symbolic presences appears problematic enough — searching out and explaining symbolic absences is likely to demand the most consummate research skill.

#### *A "virtuous" summary*

Accounting (presence) is, generally, deemed to be functional when it contributes to order and stability and dysfunctional when it leads to organizational rigidity and historicity. The value of accounting absence, however, is not often recognized. For instance, Earl (1983, p. 130), while acknowledging the recommendations made in the literature on making information systems less constraining, somewhat resignedly concludes that:

Consequently, we may do better to expect accounting systems *only* to provide stability in organizations and non-accounting information systems to provide the major challenge and adaptation. (Emphasis added.)

Earl, in line with current thinking, is obviously referring to the limited utility of accounting *presence*. Accounting, however, has a powerful liberating influence in *absence*. It is possible for management to positively "implement" accounting absence so as to foster trust, flexibility and functional symbolism towards nurturing an absence culture in the organization (cf. Flamholtz, 1983, particularly pp. 165–166).

### SOME CONCLUDING THOUGHTS ON ABSENCE

The search for and interpretation of accounting absence is an essential complement to the study of accounting presence which is represented by extant systems. The task, however, requires researchers to be vigilant and to be acutely aware of their own cognitive biases against the recognition of absence. Put differently, inasmuch that a paradigm "... serves to define what should be studied, what questions should be asked, how they should be asked, and what rules should be followed in interpreting the answers obtained ..." (Ritzer, 1975, p. 156), the current presence-oriented accounting paradigm needs to be broadened to include the enquiry of absence. This adjustment is likely to call for a somewhat specialized and speculative vocabulary, involving why nots, what ifs and could have beens.

Understanding of the absence phenomenon, this paper has suggested tentatively, may emerge out of the interplay between the possible and the desirable, the human and the technical, the planned and the improvised, the reasoned and the ritualized. In the context of the study of accounting absence, the statement "There is nothing here" is not one of abandonment but of invita-

<sup>6</sup>For instance, one might ask what happens to the symbolic activities described in Feldman & March (1981), Meyer & Rowan (1977) and Boland & Pondy (1983) once their symbolic nature is realized by the actors or recognized by the target audience? Or, as symbolic affect is context variant (just as a nation's flag in times of war and peace), how do symbolic activities and their symbolic content respond to organizational transitions or crises?

tion. Inspiration too may be drawn from the words of Dostoevsky:

So among those who cooperate the things that are seen are moved by the things unseen. Out of the void comes the spirit that shapes the ends of men.

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## AN EXAMINATION OF MANAGERIAL ACCOUNTING PRACTICES AS A PROCESS OF MUTUAL ADJUSTMENT\*

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### Abstract

Managerial accounting practices are organizational control mechanisms which serve to constrain decision-makers yet, themselves, are the outcomes of emergent resistance, force and bargaining. The contradictory nature of managerial accounting practices as a form of social control is illustrated by a study of one firm's accounting practices before and after a severe financial crisis. Here, managerial accounting is seen as a dynamic process of mutual adjustment, changing and being changed by the wider organization. Assessment of the process of mutual adjustment reveals an unfolding, reflexive decision-making process in which accounting strategies are designed to centralize the direction of resources and the monitoring of division performance. However, these accounting rules and procedures are neither neutral nor uncontested, as divisional controllers resist corporate decision-makers. New patterns of organizational autonomy and interdependency are highlighted and created by these accounting practices, as managerial interdependencies are more tightly woven around centralized corporate missions.

The conceptualization of managerial accounting practices has two contradictory social control aspects. In one sense these practices are control mechanisms of the organization, constraining all members of the organization, including the decision-makers who created them (Otley & Berry, 1980; Bruns & Waterhouse, 1975; Macintosh & Daft, 1985; Govindarajan & Gupta, 1985; Rockness & Shields, 1985). In another sense, managerial accounting practices are themselves the outcomes of emergent resistance, force and bargaining (Roberts & Scapens, 1985; Berry *et al.*, 1985; Burchell *et al.*, 1980). Accounting mechanisms, seen as both constraint and emergent resistance, furnish the basis for a more general framework which provides a way of viewing managerial accounting as a form of social

control that is a dynamic process of mutual adjustment.

The examination of managerial accounting as both constraint and resistance has attracted little systematic and sustained attention. Among the reasons for the dearth of research in this area are the lack of conceptual specification of managerial accounting practices and limited empirical research in a natural setting. Accounting is often treated as part of an abstract, homogenous and static organization level structure of control, completely external to members of the organization. Such an approach to accounting research lacks a specification of various facets of accounting control (Nord, 1987). Instead, authors refer to managerial accounting practices as a singular external fact operating in organizations to deter-

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mine, or at least circumscribe, the behavior of organizational members. Also, little inductive empirical work has been done that recognizes the multifaceted practices of accounting practices in their natural setting, generating a more complex conception of the process and consequences of accounting practices as a social control (Hopwood, 1987; see also Roberts & Scapens, 1985; Hopwood, 1983; Birnberg *et al.*, 1983).

In this article we examine the contradictory nature of managerial accounting as a set of social control processes. First, we conceptually establish the multidimensional nature of accounting in terms of contradictory processes of constraint and resistance. The multiple realms of interaction within which organizational members create and interpret different aspects of accounting practices is of particular concern in this conceptual development. We then illustrate the dynamic and contradictory nature of managerial accounting practices with a field study of one firm's accounting practices and procedures before and after a severe financial crisis. Specifically, the process of mutual adjustment in the form of response, resistance and further response around managerial accounting issues is revealed in this study. The delineation of the processes of mutual adjustment serves to reveal the fluidity and specificity of accounting, as well as the meanings attached to accounting in its reformulation.

### THE CONTRADICTORY NATURE OF ACCOUNTING PRACTICES

A human construction view of organizational behavior provides a basis for studying the contradictory nature of accounting practices as a means of social control in organizations (Crozier, 1964; Crozier & Friedberg, 1980). This view suggests that organization members are: (1) rational and adaptive to task rules and others' expectations; and (2) cognitive and recalcitrant toward external constraints on their behavior (Heath, 1976; Pfeffer, 1982). A human construction view, therefore, integrates the con-

tradictory nature of accounting practices such that accounting is simultaneously seen as an adaption to a presented social reality as well as a context for constructing a social reality (Boland & Pondy, 1983).

In the first instance, accounting as control is an abstract organizational structure constraining an individual's behavior (Bruns & Waterhouse, 1975; Rockness & Shields, 1985). Social control refers to the programs, practices, rules and procedures in an organization designed by organizational decision-makers, ostensibly to increase performance predictability. This rational perspective interprets managerial accounting mechanisms as part of these programs, practices, rules and procedures (Etzioni, 1961; Thompson, 1967; Flamholtz, 1983). From this perspective accounting is seen as an organizational characteristic, serving management in responding to external requirements.

In the latter case, patterned interaction, behavior and cognitions are themselves seen as social control (Gamson, 1968; Crozier & Friedberg, 1980; Roberts & Scapens, 1985; Birnberg *et al.*, 1983). From this perspective, control is specific, heterogeneous and dynamic, emerging out of continuing social interaction among members of the organization. Stating it even more strongly, Pfeffer (1978) suggested:

Structure, it would appear, is not just the outcome of a managerial process in which (organizational) designs are selected to ensure higher profit. Structure, rather, is itself the outcome of a process in which conflicting interests are mediated so that decisions emerge as to what criteria the organization will seek to satisfy. Organizational structures can be viewed as the outcome of a contest for control and influence occurring within the organization. Organizational structural arrangements are as likely to be the outcomes of political processes as are organizational resource allocation decisions.

Mechanisms for organizational control are seen as arising out of the political and conflictual nature of organizational life. Accounting is viewed as a set of processes that is created and given meaning through the lived experience of individual actors. This extension is important because it clarifies, specifies, and sets up multiple points of potential conflict and resistance within a fuller conception of accounting as social control.

The contradictory nature of accounting as social control can be considered in terms of Simon's (1957) and March & Simon's (1958) model of choice. This model stresses the limitations of individual decision-making in terms of decision-makers being only "boundedly rational". The importance of this assumption about decision-makers is that it gives the organizational variables predominant control over individual behavior. Sources of stability in the organization stem from the routinization of activity through the structural aspects of the organization, e.g. the establishment of programs and standard operating procedures (Perrow, 1986). In turn, however, these structural aspects are the subject of the political and conflictual nature of organizational life as members strive and compete to control the premises of decisions and the flow of information on which decisions are based (Pfeffer, 1978; Boland, 1978, 1979). These subtle and often unintrusive structural controls such as communication channels, accounting and organizational vocabulary are the consequence of patterned interaction and behavior. As Crozier (1964) suggested, the impossibility of suppressing completely the discretion of the subordinate through these formal controls contributes to the interactive nature of the social construction of these rules. This results in a persistence of personal discretion in the development, interpretation and application of the rules.

This contradictory nature of accounting practices as a means of social control within organizations runs throughout the thesis of Burchell *et al.* (1980), who suggested that what gets accounted for shapes the organizational participants' view of organizational reality (see also Hopwood, 1978). Accounting is viewed as a form of organizational structure which serves as a means of identifying problems and determining the ranges of possible actions. But rather than arising out of a direct quest for rationality, accounting may result from a regime interested in maintaining existing power relationships (see also Hayes, 1983; Hopwood, 1984). In such a situation, the externally threatened regime may seek to maintain some latitude in internal opera-

tions by solidifying its own position of power by using objectified and accepted control procedures. In turn, the perceptions of those advancing the needs of a subunit are influenced by an asymmetric control-power system, insofar as they must express themselves in terms acceptable to power interests in order to present their case effectively. As Burchell *et al.* argued, control systems can become "mechanisms around which interests are negotiated, counter claims articulated and political processes explicated" (1980, p. 17). Not surprisingly, Burchell and his colleagues recommended studying accounting systems as social and organizational phenomena affecting and resulting from the organizational political processes rather than looking at accounting as abstract organizational structures.

Similarly, Booth (1987) argued that patterned interaction around accounting information can construct a social reality, thus serving as a form of social control. Accounting systems operating within the context of the organizational control structure can implicitly maintain and construct power networks by representing and constructing the normal, accepted power relations in an organization. As Cooper *et al.* (1981) stated:

Internal accounting systems by *what* they measure, *how* they measure and *who* they report to can effectively delimit the kind of issues addressed and the ways in which they are addressed. They reflect the status quo, the appropriate and acceptable ways of doing things and talking about issues (p. 182).

Thus, accounting systems may become an instrument for deflecting attention from alternative goals, activities and processes not organizationally in vogue. Accounting may be used as a means for quelling the conflict inherent in certain social situations by passively holding up the rational, objective model along with the implication that any failure to conform to this ideal is the failure of the subunit. Concerning this point, Cooper *et al.* (1981) said:

[The] myth [such as that generated by accounting systems] helps to label what is acceptable and unacceptable by anchoring actions to the past and to explanations of past events. By explaining and reconciling contradictions between values and actual behavior and legitimate established leadership systems faced with environmental threats, myths justify and sustain specific values in organizations (pp. 183-184).

Consistent with this theme, Hopwood (1983, 1984) reasoned that much of the attraction of accounting in the construction of social reality rests with its blandness. The relevance of accounting appears to be self-evident. Similarly, Booth (1987) suggested that power is to be found in the uneventful routines of organizational life, such as accounting. Thus, the possibility of active coercion is softened by the assumption of conformity, with accepted, self-evident ways of thinking, talking and doing. Accounting becomes important in the reproduction of the control structure as part of the everyday life of the organization. Meanwhile, the force and tenacity which accounting can bring to bear in technically masking and mystifying the existing power network go unsuspected. It is a useful device for taking the debatable — such as goals, strategies, the division of labor and the locus of coordination and control — out of the realm of the political and, therefore, beyond the realm of debate. Accounting creates and imposes an apparent technical zone of control and calculation rather than a zone of political conflict among interests. However, Hopwood (1983, 1984) viewed this use of accounting information to preserve the power network as problematic. Accounting is neither monolithic nor fully under the control of a ruling regime. Rather, it comes about as a result of the interaction of a great many events, forces and constituencies. In other words, accounting does not simply exist in the world in an objective sense to be installed in the organization. Rather, accounting is socially constructed and is, in turn, constitutive in character, being complicit in the social construction of economic reality rather than merely reflecting it.

In summary, Scott (1931) emphasized that the theory of accounting had acquired an independent status as it expanded to cover the adjustment of many interests not directly adjusted by the market. The role of accounting in constructing social reality is evident in Scott's (1931) depiction of the growth of accounting functions, the increasing dependence of management upon accounts and the absorption of accounting technique into the body of social

machinery. To the extent that accounting emphasizes an asymmetrical upward flow of information and legitimizes formal, bureaucratic communications instead of informal clan communications (Ouchi, 1979), that system shifts power to higher levels within an organization's hierarchy (Barliff & Galbraith, 1978). As Weber (1947) suggested, the more important the role played by technical expertise in the functioning of a bureaucratic organization, the less responsive the organization is to the control of those who lack such expertise. Therefore, accounting can be seen intertwined in a social order characterized by the objectification and depersonalization of the structure of power and authority in both the economic and political realms (Weber, 1947).

#### RESEARCH SITE AND METHODS

The linkage between accounting as constraint and as emergent resistance is time. It is not the neglect of process in case studies as much as the lack of an explicit recognition of time that has limited the formulation of a more integrated understanding of the contradictory nature of accounting as a form of social control. The problem of studying managerial accounting in its natural setting is the problem of finding a way of examining human experience and action that simultaneously recognizes that organizational rules and procedures are made by constant and purposeful individual and group actions. In turn, these actions, once institutionalized, act back on the groups and individuals to limit and constrain their actions (Boland, 1979; Boland & Pondy, 1983, 1986). A case study of an organization over an extended period provides an appropriate way of studying this process (Colville, 1981; Tomkins & Groves, 1983; Willmott, 1983).

We used multiple data collection methods and evidence. Qualitative sources included personal interviews, personal observation and internal documents, such as minutes, charts, memos, plans and summaries. Quantitative sources included financial and industrial performance

data, and data about quantities of equipment, personnel, materials and the products of the organization. Multiple methods and data sources capture a variety of factors allowing an examination of not only accounting issues *per se*, but their relationship to wider patterns of organizational structure, decision-making and control (Van Maanen, 1979; Mintzberg, 1979a; Yin, 1981).

### *The firm*

A high technology organization (hereafter called the firm) was selected for a historical case study. The firm designs, manufactures, sells and services digital electronic instrumentation. These products and services incorporate internationally developed software used in a broad range of scientific, industrial, medical and engineering applications, including chemical analysis, medical research and diagnosis, industrial quality control and nondestructive testing of products and materials.

The firm has benefited from operating in highly profitable, high-technology growth markets. Driven more by an entrepreneurial-technological orientation than a business-marketing logic of operation, the four major operating divisions are managed on a decentralized basis. The vice-president of accounting in each division fills a line role under the division president. Five people manage each of the divisions: the president and four vice-presidents (one from each of the functional areas — engineering, production, accounting and marketing). In other words, each division has its own accounting department headed by a controller — the vice-president of accounting. Each division has individual product development teams responsible for specific product lines, supporting the sales and marketing of their products and directing new product development. These divisions are likened to “companies within a company”. The firm has developed a “folksy” style of operations promoting a “small is beautiful” idea. Its operations are consistent with the beliefs that decentralized and informal operations are most appropriate for high technology firms because of divergent and unique technologies, production

processes and markets for each division. This style extends to markets and customers, where the firm keeps communication linkages between company engineering and the customer as short as possible.

### *The firm's accounting practices*

Historically, the financial accounting process has dominated this firm's concern for accounting information. In particular, inventory accuracy has been an important part of the firm's financial accounting process. Several corporate and divisional personnel stated that the Chief Financial Officer (CFO) has always taken pride in making minimal “book-to-physical” adjustments at the year end. A Big Eight public accounting firm was also engaged in ongoing consulting to improve the financial accounting process and keep the financial statements “clean”. This financial accounting orientation was also accentuated by the fact that the CFO and most of the important corporate accountants and divisional controllers were hired from the Big Eight accounting firms.

This concern for inventory accuracy and clean financial statements contributed to the accounting staff deriving standard costs early in the firm's existence. However, the term “standard” was used in a loose sense. Several divisional controllers stated that the standards were not used for the direct control of labour and materials. This perception is evident in a 1977 memo from the CFO to the divisional controllers regarding a “Policy Statement Relating to Change in Method of Accounting for ‘Test Labor’ Inventory”. The CFO proposed to derive cost standards for test labor instead of combining it with overhead and allocating it to assembly labor. The identification of test labor made it very susceptible to further scrutiny in the form of control. The CFO, however, defined the impact of such a policy strictly in terms of it being a more conservative approach to inventory valuation that would affect year book-to-physical valuations. He suggested steps that the controllers should take in measuring test labor to be consistent in the year end valuation process. This policy statement was typical of the efforts to identify and

standardize the labor portion of product costs which appear to be motivated primarily by financial accounting concerns, i.e. inventory accuracy.

The budget process was not traditionally exploited as a rigorous and formalized control device in this firm. It basically reflected the decentralized structure and the engineering orientation of the firm. Each division operated relatively autonomously in terms of initiating operating and capital expenditures budgets. Approval and allocation was made on a relatively informal basis. Capital budgets were initiated by the divisions and informally allocated on a case-by-case basis depending on available resources. Each division submitted its operating budget expressed primarily in non-financial terms of engineering and marketing parameters (i.e. status of product line, market share). For example, the structure of the submitted budget from a division to corporate in 1980 was as follows:

- Product line review and sales analysis.
- Overall marketing plan.
- Competitors.
- Economic factors affecting the product line.
- Marketing strategy.

As indicated by such a structure, the information was relatively external in orientation, with competition and macro-economic factors constituting a large part of the budget.

Finally, an executive compensation system was developed in the late 1970s which included four key features: the system was based on the performance of the company as a whole; the

evaluation period was one fiscal year; the criteria were primarily profit objectives; and the system included only corporate personnel. The compensation system had two basic parts: the non-discretionary part A and the discretionary part B. Half of the bonus pool, part A, was allocated in shares to key corporate employees at the beginning of the fiscal year by a Compensation Committee of the Board. However, the amounts were only received if the firm as a whole achieved a desired profit objective set by the Board. The other half of the bonus pool, part B, was allocated at year-end by the same Compensation Committee. This amount was not tied to a profit objective and was defined as follows: "Subjective criteria will be the basis upon which discretionary bonuses are awarded after the consideration of available objective indices of merit" (Board Notes, March, 1977).

In summary, managerial accounting in the form of budgeting, compensation, and cost information for inventories has been in place, but not fully exploited (see Fig. 1, points A<sub>1</sub>, B<sub>1</sub> and C<sub>1</sub>). The firm has been historically guided by its entrepreneurial-technological orientation, preserving the planning and control functions in its divergent and unique technologies, production processes, and markets. Consistent with Berry *et al's* (1985) findings in their coal mine study, planning started from physical production planning; financial planning and control systems did not appear to be a dominant mode of organizational control.

However, managerial accounting does not

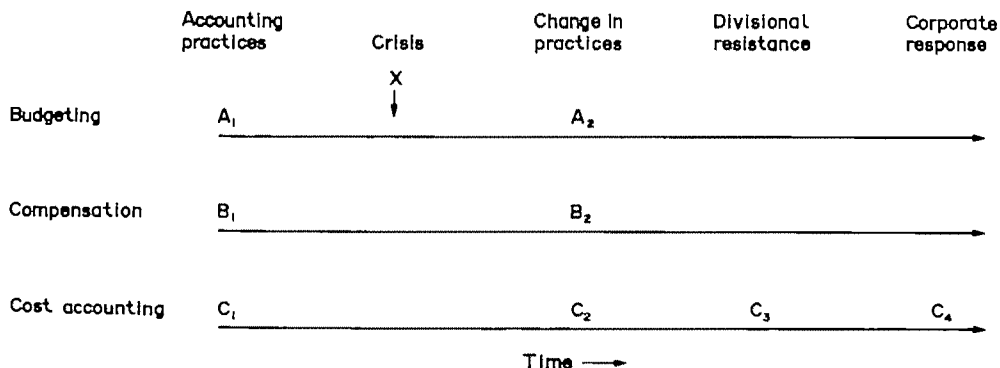


Fig. 1. Chronology of events.

necessarily have to involve physical intervention in the work process (Armstrong, 1985). Accounting, because of its preeminence within the global function of capital, can still influence the control strategy because of its general dominance. This general dominance might be reflected in the budget process which serves to rationalize resource allocation decisions as well as providing the language and setting the terms of negotiations (Armstrong, 1985). A more general dominance of accounting might also take place by capturing the loyalty and motivation of salaried managers through measures of departmental performance which are linked with practices for the evaluation and reward of these managers.

The multidimensional nature of managerial accounting practices will be considered by examining the development of these specific accounting practices after the firm experienced severe fiscal problems (Fig. 1, points A<sub>2</sub>, B<sub>2</sub> and C<sub>2</sub>). Essentially, the role of managerial accounting is revealed as it moves from the background to the foreground in the construction of organizational reality (Boland & Pondy, 1983). In particular, the development of cost accounting information is examined in terms of multiple realms of struggle (Fig. 1, points C<sub>3</sub> and C<sub>4</sub>). Divisional personnel resisted certain aspects of the change dictated by corporate financial officers and, in turn, corporate personnel responded to this resistance.

## ANALYSIS

### *Organizational crisis*

The economic environment of the firm and the industry as a whole manifested a dramatic change from one of slack resources and high profitability with each firm defining its own markets, to a more austere, competitive environment where profits decreased and industry concentration increased. These changes in the economic environment were reflected in relative rates of profitability and merger activity. The 1970s to the early 1980s illustrate dramatically that an expansion of operations was followed by

a period of overproduction and falling profits. The growth of markets for the industry's products were projected to increase from a rate of 10% in the early 1970s to as much as 16% by 1984 (*Standard and Poor's Industrial Survey*, 1978–1984). Actual shipments of finished products were consistent with these projections throughout the 1970s. Shipments grew at an adjusted rate of 9% through the 1970s and were expected to continue at this rate through the mid-1980s. In 1981, however, actual shipments had increased at a rate of only 2% and in 1982 actual product shipments for the industry fell by 1.1%. In 1983 shipments had again fallen by a full 4% (*U.S. Industrial Outlook*, 1974–1984). By 1983 the industry as a whole was caught in an overproduction squeeze. A further sign of industry crisis is reflected in changes in operating and net profit margins (see Table 1a). Operating margins stayed at or above 19% through 1980 but in 1981 began to fall off to a low of 14.2% in 1983. Net profit margins stayed consistently in the 8–9% range until the dramatic fall off in 1983 to 5.1%, representing "the worst year in memory for this industry" (*Value Line*, 1974–1985).

Merger and acquisition activity in the economy as a whole and the industry in particular contributed to an over expansion of operations. Merger and acquisition activity in the economy began to accelerate in 1981, partially fuelled by the new administration's Anti-Trust policy (see Table 1b). In high tech industries, mergers and acquisitions were extremely common at the time, generated by the changing nature of its technological base. Moreover, trade and business publications note an unusually high acquisition and merger activity in 1980 and 1981, just prior to the production–profit downturn. For example, *U.S. Industrial Outlook* said:

Rapid technological changes are taking place in the industry. The most notable progress in this area is the increasing use of electronic circuitry in instruments. The lines of demarcation between computers and instruments are blurring, and an increasing portion of the value of instruments is in their electronic components. This favors the development of new instruments particularly those using microprocessors by electronic firms, which

TABLE 1. (a) Industry margins

|                    | 1984 | 1983 | 1982 | 1981 | 1980 | 1979 | 1978 |
|--------------------|------|------|------|------|------|------|------|
| Operating margins  | 16.8 | 14.2 | 17.5 | 18.6 | 18.9 | 18.8 | 21.3 |
| Net profit margins | 7.0  | 5.1  | 7.9  | 8.7  | 9.1  | 8.8  | 9.3  |

Source: *Value Line*, 1985.

(b) Net merger and acquisition announcements, 1976–1981

| Year | Number | Year to year<br>percentage change |
|------|--------|-----------------------------------|
| 1984 | 2534   | 0%                                |
| 1983 | 2533   | +8%                               |
| 1982 | 2346   | -2%                               |
| 1981 | 2395   | +27%                              |
| 1980 | 1889   | -11%                              |
| 1979 | 2128   | +1%                               |
| 1978 | 2106   | -5%                               |
| 1977 | 2224   | -2%                               |
| 1976 | 2276   | -1%                               |

Source: W. T. Grimm & Co.

have heretofore been suppliers of components to instrument makers. *Fear that the electronic firms might become full-scale instrument makers has led many instrument producers to develop or acquire their own electronic capability.* This strengthens the ability of the traditional instrument makers to meet the challenge of finding additional applications for newly-developed instruments (1980) (emphasis added).

The industry crisis was brought about by a conjunction of several economic factors. First, since World War II the companies in this industry have had 33–50% of their sales overseas. The increasing strength of the U.S. dollar began to place U.S. producers at a disadvantage as it accentuated the relatively higher costs of manufacturing. Second, there was increased competition from European and Japanese manufacturers. In two of the firm's major markets, Japanese imports had decreased by more than 40% in 1984. Third, the economic recession of 1981–82 was more damaging than recessions in the 1970s because both American and overseas markets were facing economic problems. Finally, capital spending in the U.S. economy of the 1980s has not followed historical patterns; instead, it has fallen off significantly for products from our firm's industry. Companies have responded by discontinuing losing projects, di-

vesting, cutting payrolls and adjusting inventories by 1983. (Sources: *Value Line*, 1972–1984; *Standard and Poors: Industrial Survey*, 1978–1984; *U.S. Industrial Outlook*, 1974–1984.)

The impact of the industrial crisis on the firm is reflected in their financial reports (Table 2). The critical periods are 1981 and 1982. Growth in 1982 net sales was only 9.9%, a sharp decline from previous years' growth rates of 22.0%, 52.5%, 53.3% and 63.0% (from 1981 to 1978). The 1982 gross margin on sales fell off to 58% from previous years' averages of 63–64%. The lower gross margin indicates that the 1982 cost of goods sold rose by 24% as it increased from 36% to 42% of sales. The non-manufacturing costs increased from an average of 48% of sales prior to 1982 to 57% of sales in 1982. Net earnings from operations in 1982 fell by almost 73% (\$5.5 m to \$1.5 m) after experiencing growth of 10%, 33%, 56% and 170% in the four previous years. Earnings per share fell to 28¢ in 1982 from \$1.05 in 1981, a 73% decline. Finally, one major financial analyst company dropped the firm from its recommended buy list in 1982.

Perceptions of the financial crisis were evident in much of the Board discussions during

TABLE 2. The financial crisis (in millions of dollars, unless sign given)

|                     | 1984   | 1983   | 1982   | 1981   | 1980   | 1979   | 1978   |
|---------------------|--------|--------|--------|--------|--------|--------|--------|
| Net sales           | 112.6  | 93.4   | 79.1   | 71.9   | 59.0   | 38.6   | 25.2   |
| Cost of goods sold  | 46.6   | 38.2   | 33.2   | 26.5   | 21.6   | 13.8   | 9.4    |
| Gross margin        | 66.0   | 55.2   | 45.9   | 45.4   | 37.4   | 24.8   | 15.8   |
| Gross margin %      | 58.6%  | 59.1%  | 58.0%  | 63.1%  | 63.4%  | 64.2%  | 62.7%  |
| R&D, G&A, other     | 59.2   | 46.8   | 44.9   | 36.2   | 28.6   | 18.0   | 11.2   |
| Earnings            | 6.8    | 8.4    | 1.0    | 9.2    | 8.8    | 6.8    | 4.6    |
| Taxes               | 2.0    | 3.5    | <0.5>  | 3.7    | 3.8    | 3.0    | 2.2    |
| Net earnings        | 4.8    | 4.9    | 1.5    | 5.5    | 5.0    | 3.8    | 2.4    |
| Earnings per share: |        |        |        |        |        |        |        |
| Net earnings        | \$0.76 | \$0.79 | \$0.28 | \$1.05 | \$0.96 | \$0.82 | \$0.58 |

this period. Fourth-quarter earnings for 1981 were presented to the Board early in 1982 where it was acknowledged that earnings for the quarter were much lower than a year earlier and substantially under budget (Board Notes, January, 1982). In the summer of 1982 the CFO indicated that the firm was running the risk of violating its loan covenants by the end of the third quarter (Board Notes, July, 1982). The high level of receivables and inventory were the particular focus of this Board meeting. Severe liquidity problems were experienced in 1981 as a result of slow inventory and accounts receivable turnovers. Inventory turnover dropped to a low of 3.0 in 1981 as compared to desired levels in excess of 4.0 as achieved prior to and after the crisis. The slowness in converting accounts receivable into cash is also particularly apparent in 1981 when the firm hit a high of 123 days sales tied up in accounts receivable, as compared to a more desired level of 90–100 days (Fig. 2). The Board directed management to reduce the level of inventory and receivables by \$5 million by the end of the third quarter of 1982.

#### Interpretation

Increasing speculation and some evidence have focused on the relation between economic crisis and organization control (Burawoy, 1979; Karpik, 1978; Mintzberg, 1979b; Bacharach & Lawler, 1980; Starbuck *et al.*, 1978; Nystrom & Starbuck, 1984). The twin relations between concentration and centralization of capital provide a theoretical relationship to organizational control structures and a more specific

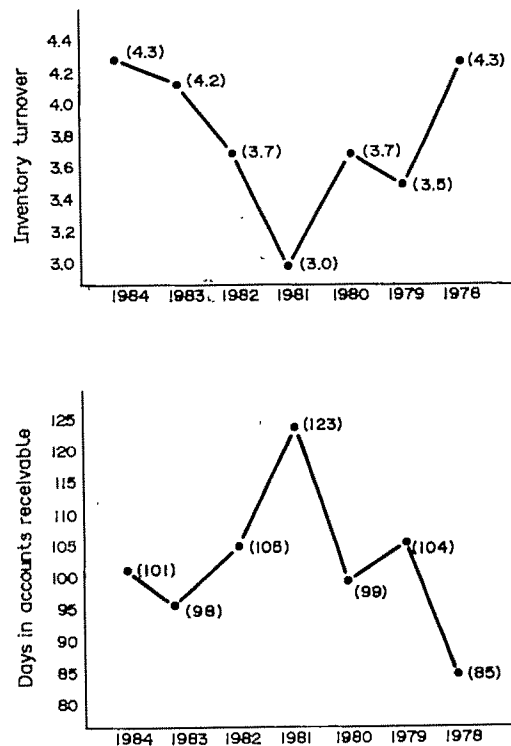


Fig. 2. Liquidity problems.

operational definition of the economic environment. Changing concentration and centralization suggest measures of relative profitability and rates of merger activities in the industry (Edwards, 1979; Burawoy, 1979). We employed the concept of organizational crisis as a combination of a rapid and dramatic decline in the environment (Meyer, 1982; Zammuto & Cameron, 1985) with management recognition of these declining profitability rates (Billings *et al.*,



1980) as threatening the organization's survival (Nystrom & Starbuck, 1984). We focused on both the objective as well as subjective features of a financial crisis on the organization (Burawoy, 1979; Clawson, 1980; Edwards, 1979).

Economic crisis, however, does not in itself explain the generation of new control strategies (Salaman, 1979). As Scott (1931) suggested, accounting has acquired a theoretical status independent of market phenomena such as crisis, expanding to cover the adjustment of many interests not directly adjusted by the market. Economic crisis, however, does provide a methodological point of attention by directing researchers to key organizational characteristics and configurations which are disturbed during the crisis (Hopwood, 1987). These structural aspects are the subject of the political and conflictual nature of organizational life as members strive and compete to control the premises of decisions and the flow of information on which decisions are based (Pfeffer, 1978; Boland, 1978, 1979; March & Simon, 1958). Accounting may result from a regime interested in maintaining existing power relationships as this externally threatened regime may seek to maintain some latitude in internal operations by solidifying its own position of power by using objectified and accepted control procedures (Hayes, 1983; Hopwood, 1984).

The concept of crisis is theoretically significant as a criterion of explanation for functional theories and a motive for social action. Mintzberg (1979b; Hall, 1986), for example, uses the concept of organizational crisis to describe an organization confronting the possibility of demise. Crisis is theoretically significant because organizational models based on functional theories of organizational systems rely on survival as the criteria of explanation (Gouldner, 1959; Scott, 1986). Crisis also serves as a motive for purposive behavior in social action models of organizational behavior (Karpik, 1978; Edwards, 1979; Nystrom & Starbuck, 1984) at both the level of the organization system and the level of the component actors (Coleman, 1986). Armstrong (1985) argued, for example, that

control strategies based on generalizations of the techniques and knowledge possessed by the accounting group are in competition for the key positions within the global function of capital. As Armstrong stated:

The response of capital to its crises ... is mediated by these professions which are poised to engage on collective mobility projects within the global function of capital in virtue of their possession of techniques which offer responses to these crises.... For accountants and other financial specialists the implication is that their increasing representation in ... management hierarchies is not simply a consequence of the 'objective' needs of capitalism but is the result of efforts by the profession to develop their original techniques into a system of managerial control ... precisely as a means of achieving managerial ascendancy (1985, p. 145).

Extending this argument, there are also conflicting and contestable issues taking place *within* this firm's accounting group during its process of "collective mobility" of accounting knowledge and techniques. Control is heterogeneous and dynamic, emerging out of continuing social interaction among members of the organization, as well as among members of the accounting group (Pfeffer, 1978; Birnberg *et al.*, 1983).

#### *Changes in accounting practices*

The very poor budgeting experience of 1982 was acknowledged at the Board meeting in the spring of 1983. The CFO set new budgetary policies by which capital equipment budgets could be submitted, controlled and monitored. It was explicitly stated in the Board resolution that the responsibility for planning, controlling and monitoring the capital budgets should be an inherent responsibility of the Executive Committee (Board Notes, April, 1983). Thus, for the first time, the allocation of capital resources was defined as a central corporate responsibility. The capital budget became a tool for directing operations as well as evaluating the divisions after the crisis.

The budgetary process was now also to be used to direct divisional operations by identifying new internal, financial, standards of performance instead of the external, non-financial process of the past. This change was expressed in a memo from the CFO to all divisional managers

and controllers regarding capital budget and operating expense controls. He stated four critical elements of the firm's future financial security:

- (1) operating expense controls;
- (2) capital budget controls;
- (3) accounts receivable levels/age; and
- (4) inventory levels/turns.

Primary responsibility for the control of these four items would continue to rest with each operation division's management team — with certain provisos, namely:

- (1) Corporate personnel will be henceforth conducting *formal periodic operational audits* (preferably, but not necessarily, on an advance basis).
- (2) Capital budgets will henceforth require a *formal project justification process*.

The important distinction in this memo is that while these four critical financial responsibilities "would continue to rest with each operating division management", the provisos effectively centralized the budget process for operations and capital expenditures by centralizing the evaluation of all four financial areas. The newly installed operational audits dealt with three issues (expenses, receivables and inventories) and the project justification process centralized the fourth area (capital budgets).

The annual budget for 1984 now had the following structure:

- A. 1983 in retrospect:
  1. Status on orders and backlog.
  2. Efforts at cost control and balance sheet management.
  3. Net income for the year.
- B. Current financial condition:
  1. Net sales.
  2. Gross profit (and %).
  3. Expenses.
  4. Net income (and %).
  5. Backlog.
- C. Human resource analysis:
  1. Goals for 1984.
  2. Sales/employee analysis (comparative ratios between 1983 and 1984 in terms of sales per employee).
- D. Current facility analysis.
- E. Current product analysis.
- F. New products and markets for 1984.
- G. Prospects for 1984:
  1. Shipments (manufacturing capacity and smoothness).

2. Inventory.
3. Gross profit margins (with detailed analysis of the impact of such items as wage costs, material costs, new product start up costs in manufacturing engineering, quality assurance efforts, strong dollar, strong foreign mix, changing mix of product lines).

Major managerial concerns that emerged during the crisis were now incorporated into the budgetary process. Divisional management teams (the president of the division along with the vice-presidents of engineering, marketing, accounting and manufacturing) were now expected to express themselves to senior personnel in financial, rather than engineering or marketing, terms. For example, the declining profits were partially due to a lack of communication about the down-turn in orders, causing an overcommitment of capital and personnel. The status on orders and the backlog was now being monitored by corporate staff through the budgetary process. The budget was also now dominated by financial concerns including a detailed analysis of the costs contributing to the decreases in gross margins. The gross margin percentage that was identified in the budget process had taken on a life of its own. A gross margin of 60% became not only a rule of thumb or contract between the division and corporate controllers, but was used by the divisional vice-presidents as a criteria for decision-making. In addition, one cash account for all divisions within the firm was also established to replace separate divisional cash accounts. Not only were accounting decisions centralized, but also these standards were institutionalized in the division decision-making process.

In 1983 the "Executive Incentive Compensation Program" was redefined by the Board in light of the financial experiences in 1981 and 1982 (Board Notes, March, 1983). Redefinition took the form of changing key features of the executive compensation system, including the criteria used, the unit of performance, the period of evaluation and who was included in the program. Although part A was left practically intact, the Compensation Program now identified explicit divisional performance criteria which the discretionary part would consider. Instead of

broad corporate profit criteria, these factors in part B included:

- (a) budgeted after-tax profits,
- (b) inventory turns and days of receivable,
- (c) level of monthly shipments,
- (d) engineering performance,
- (e) other relevant factors.

The part of the bonus plan that had been left to the subjective discretion of the Compensation Committee was now tied to very specific accounting criteria — the same criteria that were related to the problems of 1981 and 1982. These new criteria were now evaluated every quarter instead of at the end of the fiscal year as in the previous program.

A further distinction was made between corporate officers and divisional employees, including presidents and vice-presidents (i.e. marketing, engineering, accounting and manufacturing). The corporate group would continue to participate in both part A (the non-discretionary plan based on the achievement of a pre-determined profit objective) and part B (the discretionary plan based on the five new criteria based on a consolidated corporate results basis). Divisional members would participate only in part B. However, divisional management's entire bonus was now a function of these newly identified accounting criteria evaluated quarterly. In interviews, the CFO and other corporate personnel acknowledged that the changes in the compensation system appeared to be attempts to develop evaluation and reward criteria to match the requirements of corporate strategy, which now identified accounting criteria as key features of operating performance that should be monitored more often than yearly.

### *Interpretation*

By changing the budget criteria and centralizing the evaluation of operating and capital expenditure budgets as well as the cash accounts senior financial personnel were able to align each division's objectives with corporate post-crisis concerns for resource commitment. Essentially, the changing budgeting system contributed to a shift in the patterns of corporate visibility in which the divisions became more

visible to senior management groups, establishing a particular mode of surveillance (Becker & Neuheuser, 1975). From these dominant forms of managerial accounting, demands, requirements, pressures and influences were passed down the organization (Hopwood, 1987). Therefore the budget process was exploited as a tool to direct both individual and group efforts by arousing motivation toward strategies of corporate headquarters and conveying information on key standards of performance (Edwards, 1979; Flamholtz *et al.*, 1983).

Also, by tying division managements' compensation directly to division performance on key accounting criteria and shortening the evaluation period, a relatively tight fit was in place between corporate expectations and divisional performance (cf. Govindarajan & Gupta, 1985; Chenhadl & Morris, 1986). These compensation practices provided a framework within which a pattern of expectations was articulated and motivations influenced (Burchell *et al.*, 1980). Accounting parameters became visible and created a basis for organizational rewards and sanctions. By influencing the accepted language of negotiation, compensation systems shaped what was regarded as problematic in corporate terms, as well as the criteria (i.e. receivable and inventory turnover) which were used in their selection (Burchell *et al.*, 1980). As Hopwood (1987) has suggested, the economic visibility promoted by the use of these accounting numbers as economic facts enabled a particular conception of power (corporate accounting) to define the organizational mission. Essentially, the corporate group defined the economic crisis in terms of their professional expertise, therefore favoring and promoting systems of control which they best understood (Armstrong, 1985).

The changing budgeting and compensation systems suggest that the different emphases were incorporated into accounting practices. What gets accounted for can eventually shape the organizational participants' view of organizational reality (Burchell *et al.*, 1980). New patterns of organizational dynamics were highlighted and created by accounting, as managerial interdependencies were more tightly integrated

with centralized corporate missions. As Hopwood (1987) argued, the changing accounting representations of different managerial functions provided a basis for social control and a manageable organizational domain around the social reality constructed by this corporate accounting information (see also Cooper *et al.*, 1981; Booth, 1987).

### *The process of mutual adjustment*

While changes in the budget and compensation components of the accounting system were being implemented, new opportunities for revising cost standards were developing for divisional controllers. The divisions were outgrowing the capacity of their own computers. Although these computers processed information for all divisional functions, manufacturing was the primary user of computer capacity. Corporate and divisional members indicated that the new system was chosen on the basis of its improved ability to handle manufacturing information. The "Data Processing Business Plan" stated:

Data processing, i.e. management information system, is simply a tool which allows us to get our jobs done. Our main function therefore is as a utility to our manufacturing divisions, the main emphasis is on the manufacturing section. We are concerned about handling our present needs and also our future growth. The Sperry 1100 system takes care of our present needs but more importantly really sets us up to be a \$300-\$500 million company.

The new system that was implemented in 1984 was capable for the first time of tracking labor time. Divisional controllers and senior financial personnel noted that this new capacity was an opportunity to go "to a full-blown cost accounting system". By this was meant that standard costs could now be used to control labor, material and overhead costs. Therefore, direct assembly labor, as well as testing and engineering labor, could potentially be tracked to improve cost standards.

The financial downturn of 1981-82, the new computer system and the new budget and compensation system together provided a new context for the formation of group action on the part of divisional accountants. The divisional controllers created the "Standard Costing Implementation Committee", in July 1984, which provided

them with the opportunity and motivation to change managerial accounting practices. Moreover, the committee also provided a vehicle for group formation among the divisional accountants. The common concern was their mutual interest in tracking labor variances. Charged with "developing an approach to product costing and control", the committee provided a forum to express the concerns of division accountants as well as the opportunity to change managerial accounting practices.

Division controllers indicated the budget and compensation changes coupled with variations in products and markets provided the motives to change the dominant form of cost analysis. The controllers argued that they needed different cost analyses to better price various products in their division that were in competitive markets. This required more and separate information on the components of labor, materials and overheads assigned to the products. They further suggested that each division — because of different pricing constraints — was developing its own informal accounting practices to gather and use information about their particular manufacturing processes.

At their first meeting, the Standard Costing Implementation Committee defined the purposes of the committee as:

- (1) To develop an approach to product cost and control.
- (2) To develop an approach for disseminating known information to the users/divisions.

Weekly meetings were held throughout the summer of 1984 in which the details of the capabilities of a Sperry system in terms of inventory costing were considered. The agendas continued to address the specific details in terms of capabilities and the reports that could be produced. Information systems experts were brought into the meetings. In September, the committee specifically addressed "the ability to capture standard hour information". However, this issue was identified as being in the domain of the manufacturing group. The accounting group thereby assigned one of its members to monitor the progress of the manufacturing committee. The purpose of the manufacturing group was

identified as "to capture 'earned hours' vs 'actual hours', which will allow for the booking of efficiency variances for direct labor and also burden". The details of the Sperry system and the related accounting issues, such as the integration with financial accounting issues (e.g. accounts payable), price testing of inventory, etc., continued to be discussed throughout September. This committee seemed to make technical progress on all fronts.

At this point the CFO moved quickly to direct interests away from issues of labor variances. The CFO wrote a September 1984 memo regarding "Standard Cost Systems" to the Standard Costing Implementation Committee. This memo stated:

As you know, there has been considerable conversation about standard cost systems, what a good one looks like and what it can do for you. My thoughts go as follows:

- (1) A standard cost system needs to be recognized as simply a way to *estimate* the product cost portion of cost of goods sold versus the direct cost component of it and nothing more.
- (2) The measure of a good standard cost system is how do your physical inventory counts come out.
- (3) For the first time we have a chance to install a good standard cost system.
- (4) A good standard cost system need not be complex.

The CFO then identified the need to make some basic decisions regarding an appropriate accounting system. He asked the accountants to "go back to the basics". However, the CFO provided little guidance as to what these basics were, except to once again emphasize the importance of inventory accuracy. For example, his second and third major issues were:

- (2) Do you lock the stockroom and protect yourself against sticky fingered engineers who don't respect manufacturing problems? (These same people call professional accountants "bean counters".)
- (3) How often do you take physical inventory?

The CFO again took a strong stance against sophisticated standard cost systems in his internal memo to divisional controllers:

The only things left to recognize are what even the most sophisticated standard cost system in the world will *not* do for you.

- (1) It will *not* keep our company from selling engineering specials that we don't know how to build.
- (2) It will *not* keep engineers and others from ordering 1,000 pieces on the first run (when our need is one)

because the individual part price is cheaper that way.

- (3) It will *not* forestall technical obsolescence of the finished products and thus keep inventory components from becoming technically obsolete.
- (4) It will *not* improve on our MRP forecasting ability.
- (5) It will *not* improve our inventory turn rate.
- (6) It will *not* make production workers more efficient nor improve in their attitude toward quality.
- (7) It will *not* tell us what the market will bear in terms of selling price. (If any one believes that cost and selling price are related — I would like to buy you lunch, immediately.)
- (8) It will *not* improve the quality of parts being supplied by vendors.

A good system can however, help us understand the components and flow of our product costs structure and serve as a tool for improving our *judgment* as managers.

The CFO concluded:

Recognize that the physical control and preservation of inventory is a manufacturing responsibility and that the credibility of the numbers and fine tuning the cost system is an inherent responsibility of the accounting people. We really do need each other to stay out of trouble.

The CFO's position is significant in several regards. First, the CFO's memo did not address the technical issues that the accounting committee addressed. It did not discuss differences in labor variances across departments. The statement was more of a broad statement of corporate accounting culture and the requirements of corporate accounting than a technical rebuttal to the committee. Second, the memo trivialized the two months of technical work done by the committee. The memo called for simplicity, ignoring the complexity of issues dealt with by the committee. The memo also separated engineering, accounting and manufacturing domains very explicitly, emphasizing that labor control issues were primarily the responsibilities of the manufacturing people. The committee, however, was explicitly cooperative as it worked with data processing and manufacturing in the development of its positions. Third, the memo defined the charter of the committee consistent with corporate's desire to ignore the labor tracking capacities of the new computer system. One of the committee accountants expressed this point in the first post-memo meeting when he asked:

Does this memo mean that as a company we are back to square one with standard costing?

The committee decided to have its chairman make a presentation to the CFO and the controllers. The committee report started with the same statement of objectives as defined by the CFO:

A good standard cost system can help us understand and serve as a tool for improving our judgment as managers.

The report went on to describe technical issues it had been addressing over the summer months such as part cost summaries, cost of materials, procedures to control the account numbers that can be used for stockroom disbursements, etc. Interestingly, however, the committee expressed their continued interest in the standard cost issue:

We have been consulted on a regular basis regarding the labor collection system that is currently being designed for manufacturing. It would appear that this system, with limited additional requirements, will be the basis to allow accounting to understand their labor variances.

The report reconciled itself with the CFO's memo by concluding:

We have reviewed the September, 1984 memo to ascertain whether the needs of the firm as espoused by the CFO would coexist with the goals of the committee and concluded that they do.

The committee stated that they did not see the need for a cost system that captures every movement of inventory but did not see a need to deal with variance accounting. They believed by integrating system design changes with manufacturing that they would better meet the needs of the firm. The committee then recommended the following:

The labor collection system being developed for manufacturing should be embraced by the financial group as their future ability to capture labor variances and they should devote up-front effort to make sure that the design will be adequate for all divisions.

The critical issue raised by this resolution and the work of the Standard Cost Accounting Committee in general is the opportunity for an alliance of interests between accounting and manufacturing around the control of the labor process. This issue is particularly significant in the light of the traditional role of the accounting group (i.e. financial accounting focus) *vis-à-vis* the accounting culture set by the CFO and the

more specific memo in September of 1984 that essentially told the divisional accountants to stay out of manufacturing. The committee provided a gratuitous and possibly temporary reconciliation of their objectives with the CFO's memo and continued to pursue their interest in labor costs with manufacturing where it was resolved that:

Each committee member must devote sufficient time with their respective manufacturing manager in better understanding the Sperry inventory system from manufacturing's perspective. Through a heightened appreciation of manufacturing's requirements and an enlightened understanding of the manufacturing system we will be in a better position to identify what we need, but probably more importantly, what we can get by way of a standard cost system and for purchase price variances.

As indicated by the documents presented earlier, the CFO was explicitly against any form of labor tracking. Senior financial personnel indicated that there was a general recognition of division members' interest in tracking labor variance. One senior financial staff member said:

There was a perception for a while that divisions were going to go to a full-blown cost accounting system. So we had to back them off from this perception. The key issue is that we don't need a more sophisticated cost accounting system. Keith [the CFO] has not signed up for a full-blown system. Labor content is 3-5% of costs, why bother? However, labor content is becoming more important with new products. Divisional people feel pressure but they can't decide what should be done. They haven't sold [Keith] on it.

Corporate financial personnel were aware of the developing alliance between divisional controllers and the manufacturing people. In fact, the interest in a labor variance on the part of division controllers was attributed to the fact that several cost accountants and manufacturing people who had previously worked in mass production industries had been hired shortly after the crisis. For example, the CFO stated:

We hired manufacturing people who came from mature organizations who wanted to install standard costing. It took them a while to realize that you don't live or die on a few pennies. You live and die on the ability to get in and out of business.

Another corporate accountant stated:

The firm has imported talent. Bob was brought over from Gould who, in turn, hired a number of production people from there who are familiar with the cost manufacturing

area. These managers from the big businesses wanted more out of the information system. The accountants in the division are inexperienced compared to the production people. This puts the relatively naive controllers in a weak position to these managers because they don't understand the sophistication of the Sperry. So the accountants go along with it. The manufacturing group is more experienced than the controllers. The key issue is that we don't need a more sophisticated accounting system.

The eventual corporate response to these shifting loyalties and agendas at the divisional level was carried out in the form of a corporate reorganization in the spring of 1986. Corporate management had decided to instill responsibility in the divisions by making each controller directly responsible to the CFO. The controllers would now fill a staff role to the division president in contrast to their earlier line role. The controller now had responsibility for providing department managers with specialized services, including advice and help in budgeting, analyzing variances, pricing and the making of special decisions. The division controller continued to exercise direct authority over the accounting departments. Their authority to prescribe uniform accounting practices and reporting methods was now directly delegated to the controller from the CFO. The CFO authorized uniform accounting practices, which all controllers installed in their divisions. When the controllers prescribe the line department's role in supplying accounting information, they are not speaking as the controller or the division president, but as the CFO and corporate management.

As the CFO stated:

We have strengthened the corporate structure. This is serving to make possible a central type of command. We are promoting accountants to divisional managers. This is the notion of a Machiavellian Prince (promoting from a distance). This was the only way available to influence decentralized management. We had incentive plans but it didn't change things. We have come back to centralization. The Board said we had to change the structure. The first thing we did was change the accounting. The second change was personnel. Both are committed to central control. Divisional accountants now report to me. We have also centralized new product development. We can kill it at any time. We couldn't do that before.

The CFO felt that the ideas suggested and implemented by controllers previous to this restructuring were a result of their commitment

to the division managers rather than corporate accounting. As the CFO stated:

It was difficult for the controllers. Some dabbled on their own. They tried to satisfy both masters. It was different in each division. They each did it in their own way. I was trying to get the guys to stop doing so many things. Hybrid systems of accounting proliferated. The accounting job had a lot less to do with running the business and more to do with creating and tracing reports. If departments and divisions are not satisfied with the accounting system they will create their own information. Garage operations show up. So we centralized accounting. I'm trying to get the guys to stop doing so many things.

### *Interpretation*

The key components of the relationship between division controllers and corporate headquarters are that of control and influence, as senior financial officers and division controllers are tied together by accounting-related control mechanisms (Gamson, 1968; Johnson, 1983). Accounting rules and procedures are a formalized set of expectations and responsibilities for the division controllers that may contradict less formal, but real, expectations and responsibilities which the controller feels as a member of division management. Although accounting rules may be used as an expression of organizational expectations, and consequently impact on divisional practice, these expectations must be reproduced by the divisions (Giddens, 1979; Cohen, 1968). Essentially these accounting practices serve as a means of social control by both presenting a social reality as well as providing a context for constructing a social reality (Crozier, 1964; Crozier & Friedberg, 1980; Boland & Pondy, 1986). If these organizational values are not reproduced in the construction of social reality, then expectations will be altered or the division will not receive continued support. In this firm corporate expectations were not altered; divisional controllers did not receive support.

Armstrong (1985) argued that the multidivisional form actually increases the volume of accounting information, placing control more firmly within the domain of corporate accounting. The codification of accounting rules and procedures is a major factor in the conflicts between corporate financial personnel and the

division controllers who may resist and resent the destruction of their power bases. Controllers may try to modify these accounting rules and procedures in their favor. This modification might be done in such a way as to deprive corporate personnel of as much as possible of their potential for constraining the divisions, as well as empowering divisional managers by providing them with the enabling resources that relate to their internal operations. In each case controllers are hoping to increase their capacity and that of their divisional managers to maneuver. Armstrong (1985) felt that this resistance testifies to the shift in the balance of power to the corporate level that accompanies multidivisionalization. It represents a further subordination of operational to financial decision-making or, in effect, a downgrading of divisional managers in favor of corporate accounting. This subordination allows multidivisional corporations to entirely divorce headquarters from operations at the divisional level, while at the same time subjecting divisional managers to a battery of financial indicators and budgetary controls.

The resistance by division controllers seemed to be motivated by the accounting rules and procedures authorized by corporate decision-makers which diverged from informal expectations and the responsibilities of the division controllers. The changing budgeting and compensation systems at the corporate level did not have within them a formal mechanism for the recognition and analysis of the uncertainty which the divisional controllers found themselves managing. As Argyris (1977) has suggested, reliance on control system requires a balance between tolerating injustice as to their inability to reflect complexity and loyalty to the institution by controllers; and between being unjust to controllers and making the overall social systems productive by controllers. In part this is done by not pushing the control system to do too much, by not taking it too seriously.

In this firm, however, the information production in the form of budgeting and compensation was taken seriously and, as a consequence, produced its own uncertainty. The changing accounting practices became control

mechanisms of the organization, constraining all members of the organization, including the divisional accountants (Otley & Berry, 1980; Macintosh & Daft, 1985; Govindarajan & Gupta, 1985). The changing accounting systems were not so much to manage the divisions, *per se*, but to make the corporate concerns those of the divisions. As Berry *et al.* (1985) suggested, this approach seems quite common, especially for "newly poor" organizations (those which suddenly find themselves in resource restricted environments and with a dramatic decline in their apparent performance). However, these accounting rules and procedures, once created, are neither neutral nor uncontested (Salaman, 1979). They are not neutral because, in structuring the field of relations and responsibilities of financial personnel, they give advantage to some and not to others. Thus, managerial accounting practices are also themselves the outcomes of emergent resistance, force and bargaining (Roberts & Scapens, 1985; Berry *et al.*, 1985; Burchell *et al.*, 1980; Boland, 1978, 1979; Hopwood, 1987).

Corporate personnel were also very concerned with the recruitment and dominance of production logics within the divisions. The recruitment of cosmopolitan production managers (Gouldner, 1957) who were involved with cost accounting developments elsewhere, contributed to the development of the accounting function within the divisions. To some extent, corporate personnel interpreted this development of accounting within the divisions in terms of an organizational "garbage can" (Cohen *et al.*, 1972), with its development stemming, in part at least, from the fact that it existed. At a more critical level, corporate personnel seemed to perceive cost accounting at the division level as a shared strategy of control, not offering the mystique and indeterminacy useful in the collective mobility of accounting knowledge. Instead, corporate accounting seemed to find broader, organizational opportunities for the expansion of accounting practice. Roles were created for accounting, with corporate accountants pointing to the potential of their systems and seeking to establish connections between accounting



and other forms of organizational practice by integrating them into the budget and compensation systems (Burchell *et al.*, 1980). The advantage of this level of control was the possession of a control strategy whereby the accounting profession maintained a certain mystique and indeterminacy about it so that the strategy can be operated only by themselves (Armstrong, 1985).

Finally, corporate accounting reorganized the role and responsibilities of the divisional controllers such that these controllers now had only a staff responsibility to the divisional president and a direct line responsibility to corporate accounting. The principal function of this structural change in the accountability was its penetration of the divisions (Roberts & Scapens, 1985). Accounting information would now more directly bridge the physical distance between divisions and headquarters. What was physically remote from top executives was now made visible through the division controller. In effect, the logics of corporate accounting were moved from a background to a foreground position by giving the controller a presence at the division level (Boland & Pondy, 1983; Becker & Neuheuser, 1975).

### CONCLUDING COMMENTS

Our analysis suggests that changes in different and specific elements of managerial accounting practices by senior personnel were designed to bring the behavior of divisions into alignment with their perceived economic context of the organization. The economic crisis seemed to have an unsettling effect on top management. As Berry *et al.* stated:

... a fascinating arena where different philosophies within the organization — one emphasizing the logic of the production and the need to buffer the technical core and the other emphasizing the logic of the market and the needs to respond to changing environmental demands — are no longer kept apart ... The nature of management control and the role of information within this milieu remains to be seen (1985, p. 25).

The economic crisis and the related changing organizational configurations raised the issue of asymmetries in information between the divi-

sions and corporate headquarters. Repeated assessments of corporate actions revealed an unfolding, reflexive decision-making process. Top management entertained numerous accounting strategies designed to centralize the direction of resources and the monitoring and sanctioning of division performance. Essentially, accounting was brought to the foreground and created a particular form of economic calculation within the organization, legitimizing and creating power in centralized corporate accounting (Boland & Pondy, 1983; Hopwood, 1987). The more important the role played by technical expertise, the less responsive the organization to the control of those who lack such expertise (Weber, 1947).

More specifically, the analysis suggests that accounting practices such as budgeting, compensation and cost standards served to control operations at different levels in the organization. Budget and compensation practices tied division operations to corporate requirements. Division controllers, however, were caught in a bridging position, bridging between formal (i.e. corporate) definition of accounting practices and informal practices of accounting developed in the divisions to meet their specific management requirements. At this point, as Argyris (1977) suggested, control systems are inherently limited. The sheer information processing costs of a system necessary to minimize both the misunderstandings of those controlled and the injustices to those who control (in the sense that the complexity of what they do is not reflected by the control system), would be too high to permit the existence of such a system. If neither party, corporate or division, pushes the control system nor takes it too seriously, the dilemma will remain dormant. If, on the other hand, and as seen in this firm, the corporate group exploits the system, then negative group dynamics such as defensiveness and advocacy result and the system is attacked. Similarly, if divisional controllers unilaterally question the tenets of the system, they will be seen as disloyal and, again, dysfunctional group dynamics will result. This bridging requirement served by divisional controllers raises the important relation of com-

mitment and accountability between division controllers and their divisional managers versus corporate financial personnel.

Importantly, the cost accounting system proposed by the divisional controllers did not seem to address the needs of corporate management for the development of financial information. Instead, it was perceived that this would have lodged more information, of questionable worth, at the division level. The process of negotiation between corporate personnel and the divisions as to the worth of this information revealed different perspectives as to the role of accounting. Divisional efforts to mutually adjust to centralized accountings were partially based on the pressures they perceived as stemming from the newly instigated formal accounting practices (Argyris, 1977). The new accountings

produced their own form of uncertainty (Hopwood, 1987). However, their process of mutual adjustment was not consistent with corporate perceptions; therefore corporate management centralized accountability of division controllers. Division accountants were now directly responsible to the CFO with only staff responsibility to other divisional executives. The CFO indicated that this latter strategy better achieved the needs of top management to monitor and direct each division, thus correcting the problem of information asymmetries. This difference between formal (i.e. corporate) directives on accounting practices and informal (i.e. actual) practices of accounting in the divisions indicates the dynamic nature of organizational accounting.

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## A BEHAVIORAL STUDY OF ACCOUNTING VARIABLES IN PERFORMANCE-INCENTIVE CONTRACTS\*

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### Abstract

The purpose of this paper is to report an experiment on the role of internal accounting variables in performance-incentive contracts. Unlike the previous behavioral studies in the area, subjects in the experiment interacted as competing employers and workers over a series of contracting periods. This procedure made it possible to examine the process by which accounting-based performance-incentive contracts were produced under conditions of information asymmetry and state uncertainty, as well as providing new tests that replicated the previous studies.

Internal accounting provides information about worker performance which may be valuable in the design of incentive-pay contracts. This value arises in situations where an information asymmetry exists between an employer and a worker about the latter's labor input due to the prohibitive cost of perfect monitoring.<sup>1</sup> In such situations, labor input cannot be used as a basis for incentive-pay contracts. An alternative approach is to base incentives on measured output or performance (e.g. cost or profit). A performance-incentive contract may affect labor input in two related ways: (1) the type of worker who is attracted by the contract and (2) the effort he or she exerts once on the job (Waller & Chow,

1985). To control these effects through contract design, an employer must consider how different workers in the labor market will respond to his or her contract offer. A key factor affecting their responses is the set of alternative contracts offered by other employers.

Two previous behavioral studies have examined the effects of accounting variables in performance-incentive contracts. Chow (1983) offered subjects, who varied in performance capability (i.e. skill and/or effort aversion), the choice between standard-based and fixed-pay contracts. In the standard-based contract, pay was high if performance met or exceeded the standard and low otherwise, whereas in the

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<sup>1</sup>The terms "employers" and "workers" refer to the two groups of individuals linked by the employment relation. Workers include all subordinates regardless of organizational level or task (e.g. direct laborers line, supervisors and division managers). The terms "principals" and "agents" are not used, because (1) these terms are too general for present purposes, and (2) this study's experiment was not intended to test specific results from the mathematical theory of agency (see Baiman, 1982).

fixed-pay contract, pay was the same regardless of performance. Pay was hypothetical in each contract. Chow reported that subjects with higher (lower) performance capability tended to choose the standard-based (fixed-pay) contract. Waller & Chow (1985) also offered subjects the choice between standard-based and fixed-pay contracts, but under state uncertainty. The standard-based contract differed from that in Chow (1983) in three ways: (1) pay was real, not hypothetical, (2) pay was linear in performance over the standard, and (3) a "controllability filter" which removed the effects of a state variable on measured performance was present or absent. Waller & Chow reported that subjects' performance capability was positively associated with the standard-based performance incentives in the contracts they chose, and that this association was stronger in the presence of a controllability filter, presumably due to the depressed effect of risk aversion.

These studies shared two limitations. First, both studies focused on only *workers'* contract choice and related behavior. An advantage of this focus was to facilitate systematic examinations of workers' response to (experimenter-controlled) contract offers. Such examinations may be valuable in their own right and as an evidential basis for employers designing contracts that produce better self-selection and effort effects. Nevertheless, employment contracts emerging in naturally occurring contexts clearly depend on decisions made by employers regarding contract design as well as on workers' contract choices (cf. Waller & Chow, 1985, p. 472). Further, as noted above, a given employer's contract design must take into account the actual or expected set of alternative contract offers facing workers. The effects of interaction between competing employers and workers could not be examined in the previous studies. Second, both studies used "one-shot" experiments in which subjects were permitted only one contract choice. This provided no opportunity for subjects to learn through feedback or for examinations of the dynamic process by which contract choice revision occurs over time.

The purpose of this paper is to report an ex-

periment in which subjects served as employers or workers for a series of contracting periods. In each period, employers designed contracts by specifying the salary, standard, bonus per unit of performance over standard, and presence or absence of a controllability filter. The contracts were offered to workers who varied in performance capability. Each worker chose a contract under state uncertainty, performed a production task after observing the realized state, and was paid in accordance with the chosen contract. Units of output were sold in a product market, and employers received their profits in cash. This experimental procedure effectively created a small economy and permitted an examination of the role of accounting variables in the dynamic, interactive process by which employers and workers form performance-incentive contracts.

The remainder of the paper is organized as follows. The second section provides a background and develops the hypotheses tested in the experiment. The next two sections describe the experiment's method and results, respectively. The last section provides a discussion and some suggestions for future research.

## BACKGROUND AND HYPOTHESES

As a background, a brief discussion of a worker's contract choice process based on the Waller & Chow (1985) framework is presented. In connection with this framework, two hypotheses pertaining to the effects of standards and controllability filters in performance-incentive contracts are stated. Then, a hypothesis pertaining to employers' revision of contract offers over time is presented.

### *Worker contract choice*

A worker's contract choice process involves an evaluation of the attributes of contracts offered by employers (e.g. performance measure, rewards and standard difficulty) in light of his or her personal attributes (e.g. skill and preferences regarding effort, rewards and risk). The chosen contract presumably reflects the best fit as assessed by the worker at the time of choice.

However, goodness of fit may change over time, leading to post-contracting mismatches and perhaps turnover, either because of real changes in the worker's or contract's attributes or because of experientially informed revisions in pre-contracting perceptions that were vague or incorrect. The possibility of such changes indicates a need for examining workers' choices over a series of contracting periods, as in this study's experiment.

Holding perceptions constant, a worker's goodness of fit assessment requires consideration of how his or her performance capability translates into performance and rewards under a given contract. Under a performance-incentive contract, higher (lower) performance capability normally produces higher (lower) performance and rewards. However, this translation often is probabilistic due to task-related state uncertainty, such that a worker's risk preference as well as performance capability affects his or her contract choice. Assuming worker risk aversion, accounting variables such as standards and controllability filters may play important roles in performance-incentive contracts, as elaborated below.

#### *Performance standards*

When workers vary in a pre-contracting attribute that will affect performance, and screening on that attribute is precluded by informational or other constraints, a contract's self-selection effects may be important. For example, when workers vary in their subjective probability of quitting within a given period, offering a two-part contract in which current pay is lower than the market wage but future pay (assuming continued employment) is higher may tend to attract workers with a relatively low subjective probability of quitting and thereby reduce turnover costs (Salop & Salop, 1976; Waller, 1985). Similarly, when workers vary in performance capability (which is assumed to be unobservable by employers), offering a contract with higher performance incentives compared with other

employers' offers may tend to attract those workers with relatively high performance capability (Stiglitz, 1975).<sup>2</sup> However, given state uncertainty and worker risk aversion, the beneficial self-selection effect of performance incentives is accompanied by the costly imposition of risk on workers. An advantage of standard-based, performance-incentive contracts, as opposed to pure linear contracts, is that the self-selection effect can be brought about with less risk being imposed on workers (Demski & Feltham, 1978).

As noted earlier, Chow (1983) and Waller & Chow (1985) reported a positive association between subjects' performance capability and standard-based performance incentives in the contracts they chose. A re-examination of the association in this study's experiment may be valuable for two reasons. First, because the experimental setting contained a series of contracting periods, it was possible to assess whether the association changed over time as subjects accumulated contracting experience. Second, because contract offers were made by subjects rather than by the experimenters, it was possible to assess the extent to which standards were relied on when subjects designed performance-incentive contracts.

*H<sub>1</sub>. There is a positive association between workers' performance capability and the standard-based performance incentives in the contracts they choose.*

#### *Controllability filters*

A basic principle of internal accounting is that workers should not be held accountable for outcomes over which they have no control, i.e. a controllability filter should be used whenever feasible. Although this principle has considerable merit on fairness grounds, its normative value depends on the circumstances (Demski, 1976; Baiman & Demski, 1980). For example, allocating common costs to unit managers may serve a useful communication role and affect their behavior in ways that benefit an organization (Zimmerman, 1979). While acknowledging such effects, this study focused on the role of

<sup>2</sup>Alternatively, a given employer might offer more than one contract designed such that workers reveal their performance capability through self-selection and are paid accordingly by that employer.

controllability filters in performance-incentive contracts formed by an employer and a risk-averse worker under state uncertainty. In particular, assuming that a worker is hired to apply his or her performance capability in a productive task rather than to share risk with an employer, it is undesirable for a worker's contract choice to be influenced by his or her risk preference. The imposition of risk on workers is desirable only when proper incentives cannot otherwise be created. Including a controllability filter in a performance-incentive contract reduces a risk-averse worker's exposure to state uncertainty. A beneficial self-selection effect arises due to the lower relative effect of risk aversion and higher relative effect of performance capability on a worker's contract choice, as documented by Waller & Chow (1985).

This study's experiment permitted an alternative test of the value of controllability filters. To explain, consider the concept of a "compensating pay differential" from labor economics (Ehrenberg & Smith, 1985). When jobs offered by employers are identical, competition requires that all employers pay the same wage at equilibrium, holding worker attributes constant. When jobs differ on non-wage attributes, which are important and known to workers, these differences will be reflected by compensating pay differentials at equilibrium, which are positive (negative) for undesirable (desirable) attributes. For example, jobs with higher risks of injury or death are associated with higher wages, other things being equal (Smith, 1979; Brown, 1980). Analogously, for risk-averse workers, a controllability filter is a desirable contract attribute, which should have a compensating pay differential associated with it at equilibrium. In other words, risk-averse workers will accept lower mean pay when a controllability filter is present and demand higher mean pay when a controllability filter is absent, other things equal.

*H<sub>2</sub>. Mean pay is lower for workers choosing contracts with a controllability filter, other things equal.*

#### *Employers' revision of contract offers*

Previous behavioral studies have not address-

sed the question of how competing employers make contract design decisions and revise their decisions over time. Nevertheless, these decisions clearly are just as important as worker contract choices in understanding employment contracting and the role of accounting variables therein. Unfortunately, conventional economic analyses provide only partial insight into employers' decision and learning processes. Labor economics' assumption of profit maximization is useful for predicting labor market outcomes (Ehrenberg & Smith, 1985), but not for understanding the information processing underlying an employer's decisions. Agency theory's assumption of principal utility maximization similarly is not process-oriented (Baiman, 1982). An additional limitation of agency theory for present purposes is its suppression of the agent's set of contract alternatives with the concept of "reservation price." Indeed, the reason for having multiple employers in this study's experiment was to make possible such a set of alternatives and examine the effects on employment contracting.

An alternative approach to relying on economic models is to develop and test information processing models for employer decision-making and learning. As a start, we hypothesize that employers with the goal of profit maximization revise their contract offers in response to feedback on prior period outcomes in the following manner. Employers examine available feedback information (e.g. profit or number of attracted workers) to evaluate their prior period outcomes, and base future contract offers on this evaluation. When information about competitors' prior period outcomes is available, an employer's evaluation involves a comparison of his or her outcome against competitors'. If an employer's prior period outcome was favorable (unfavorable) relative to competitors', there would be minimal (nontrivial) revision in the contract offered in the next period. Further, if the outcome was unfavorable, revision probably would be in the direction of the contract offered by the competitor with the most successful outcome (e.g. highest profit). This learning process is denoted the "win-stay, lose-shift" strategy.



$H_3$ . Employers use a "win-stay, lose-shift" strategy for revising their employment contract offers period to period.

These hypotheses were tested in the experiment reported in the next two sections.

## METHOD

### Overview

Subjects acted as employers or workers in either of two labor markets.<sup>3</sup> Employers designed one-period contracts having the following general form:

$$w = a + b(x - s) \text{ if } x > s; \\ w = a \quad \text{if } x \leq s;$$

where  $w$  is total pay,  $a$  is salary,  $x$  is performance,  $s$  is the performance standard and  $b$  is the bonus per unit of performance over standard (cf. Waller & Chow, 1985). Possible values of  $a$ ,  $b$  and  $s$  ranged from zero to various maxima. Also, performance could be measured with or without a controllability filter. When a controllability filter was present (absent), a state variable had a minimal (substantial) effect on a worker's measured performance. Thus, a variety of special cases of contracts (e.g. fixed, piece-rate and mixed) could occur. Importantly, it was possible to design contracts *without* a performance standard ( $s = 0$ ) or controllability filter. Each worker chose one of the offered contracts under state uncertainty, performed a production task after observing the realized state and was paid in accordance with the chosen contract. The production task involved translating symbols into alphabetic characters using a decoding key, where one correctly decoded symbol constituted one

unit of output (cf. Chow, 1983; Waller & Chow, 1985).

There were five periods in total, spread over several weeks: pre-contracting period, preliminary contracting period and three main contracting periods. In the pre-contracting period, each worker's performance capability and risk preference were measured. The preliminary contracting period acquainted employers and workers with the experimental procedure. In each of the main contracting periods, employers designed contracts, after receiving feedback on the prior period's outcomes and workers chose one of the offered contracts, after receiving feedback on their performance and pay for the prior period.

### Subjects

Subjects were 110 upper-level undergraduate and M.B.A. students enrolled in cost or managerial accounting courses at the University of Arizona. There were 12 employers and 43 workers assigned to each market.<sup>4</sup>

### Procedure and task

**Pre-contracting period.** After a practice exercise, workers performed the production task for two 5-minute trials, given the instruction to decode as many symbols as possible and fixed pay of \$1.50. Their performance in the second trial was used as a measure of performance capability (denoted PC below). They also completed a questionnaire including two measures of risk preference. One measure involved choices for three pairs of hypothetical lotteries. The first (second, third) pair was the choice of receiving \$50 (\$25, \$12.50) for sure vs a 0.50 chance of receiving \$100 and a 0.50 chance of receiving

<sup>3</sup>In the original experimental design, the labor markets differed in terms of feedback provided to employers. In market 1, each employer received feedback on his or her competitors' profits for the prior period, whereas in market 2, the employer did not. The intended purpose of this manipulation was to assess the effect of knowing competitors' prior profits on a given employer's contract revision. This effect turned out to be negligible, however, apparently because other feedback (i.e. number of attracted workers) was informationally redundant with competitors' profits in the relevant contracting periods. Indeed, the markets were surprisingly similar with respect to most outcomes, as reported below. Accordingly, in the tests of  $H_1$  and  $H_3$ , the results were collapsed over the markets to provide more powerful tests. Such a procedure could not be done in the case of  $H_2$ , for reasons described later.

<sup>4</sup>The number of workers participating varied slightly from period to period.

\$0. Workers were placed in five categories: those who chose the risky lottery in all three cases, only in the second and third cases, only in the third case, in none of the cases, and others. The first four categories are ordered in terms of increasing risk aversion. This measure is denoted RISK1 below. The other measure involved responses regarding the maximum buying and minimum selling prices of two hypothetical lotteries: 0.50 (0.50) chance of receiving \$100 (\$0) and a 0.80 (0.20) chance of receiving \$100 (\$0). For each worker, the average of the buying and selling prices for each lottery was computed, and the averages were summed. The latter measure is denoted RISK2 below.

*Preliminary contracting period.* Employers were told that they would compete to attract and motivate workers by designing and offering employment contracts in a labor market. Their return would be an initial endowment of \$3.00 plus profits earned or minus losses incurred. They were told that attracted workers would make products saleable to (automatized) customers and that workers varied in terms of how well they performed the task. They were shown a frequency distribution of all workers' PC levels. They were told that customers place orders of three possible sizes. Specifically, order size was a state variable with the following distribution: a 0.40 probability of a four-unit order selling for \$0.20, a 0.40 probability of a five-unit order selling for \$0.25, and a 0.20 probability of a 17-unit order selling for \$0.85. The expected value of an order size was seven. When computing employers' revenue, but not workers' pay, partially completed orders were treated on an equivalent-order basis. For example, if three units of a four-unit order were completed, revenue would be \$0.15 for that order. Since marginal revenue per unit was \$0.05 regardless of order size, the state variable had no direct effect on employers' revenue. However, because each worker was assigned to work on only one size of customer order, the state variable affected his or

her performance when measured in terms of orders, though not when measured in terms of units.

Contract design involved specifying the values of four attributes. One attribute was salary (\$0.00, \$0.01, ..., \$1.00). A second attribute was the type of performance measure, completed orders or completed units. The order measure has no controllability filter since the order size could have a substantial effect on measured performance. The unit measure had a controllability filter since the order size always had a minimal effect on measured performance. A third attribute was standard difficulty, i.e. the performance level which had to be reached before any bonus would be paid. Standard difficulty was stated in terms of orders (0, 1, ..., 25) or units (0, 1, ..., 125), depending on the performance measure.<sup>5</sup> A fourth attribute was a bonus for performing over standard. The bonus was stated in terms of orders (\$0.00, \$0.01, ..., \$0.35 per order over standard) or units (\$0.000, \$0.001, ..., \$0.049 per unit over standard), depending on the performance measure. In connection with the performance measure, there was an "accounting" cost to give employers an incentive to offer contracts without controllability filters. The cost was \$0.02 per order if the order measure was specified or \$0.01 per unit if the unit measure was specified. Based on the expected value of seven units per order, the accounting cost was only \$0.003 per unit if the order measure was specified. Prior to contract design, employers were told that a worker could reject all contract offers and instead draw unemployment compensation of \$0.35.

The employers' contracts, along with the unemployment compensation alternative, were displayed to workers. Prior to contract choice, each worker received feedback on his or her PC and was shown a frequency distribution of all workers' PC levels. Each worker was told that after contract choice he or she would be assigned to work on only one size of order: four-unit size with a 0.40 probability, five-unit size

<sup>5</sup>The maximum standard difficulty was considerably higher than the highest PC level — 106 units or 15 (106/7) orders.

with a 0.40 probability, or 17-unit size with a 0.20 probability. Each worker indicated his or her contract choice on a response sheet, which was collected before proceeding, and received a booklet containing symbols to be decoded. Each page in a booklet represented a customer order, displaying either four, five or 17 symbols. All pages in a given booklet had the same order size. Booklets were distributed among workers according to the state probability distribution. Workers performed the decoding task for a 5-minute period.

*Main contracting periods.* Each employer received the following feedback about his or her firm for the preliminary contracting period: contract offered, number of attracted workers, output and labor cost for each worker, and profit statement. In addition, each employer in market 1 (see note 3) received the following information about his or her competitors for that period: contract offered, number of attracted workers and profit statement. Each employer in market 2 received comparable information except that competitors' profit statements were excluded. Markets 1 and 2 were run separately. Each employer designed a new contract to offer in the upcoming period, i.e. first main contracting period, and these contracts were displayed to workers. Each worker received the following feedback for the preliminary period: contract choice, assigned order size, performance in units and orders, salary, bonus and total pay. Each worker chose a new contract for the upcoming period, indicated his or her choice as before, received a booklet containing symbols to be decoded, and performed the decoding task for a 5-minute period.

The procedure and task for the second and third main contracting periods were very similar, except that feedback about the prior period's outcomes was appropriately updated. For a given period, feedback was available only for the immediately preceding period. At the end of the experiment, the same measures of the workers' risk preferences were obtained again.

#### *Measures*

In addition to PC, RISK1 and RISK2, the fol-

lowing measures were used. In the test of  $H_1$ , a contract's performance incentive was the bonus that the worker with the *highest* PC would earn, i.e. the bonus based on performance of 106 units for unit measure contracts or 15 (106/7) orders for order measure contracts. In the test of  $H_2$ , a worker's total pay was the sum of his or her salary and bonus. To control for contract attributes other than the controllability filter, the ratio of salary to total pay was used as a covariate. In the test of  $H_3$ , contract revision was measured by the change in the general attractiveness to workers of an employer's contract offer from period to period. General attractiveness was used because of the many possible trade-offs among the four contract attributes. A contract's general attractiveness was the mean total pay that would be earned by the 11 workers whose PC levels equalled the 0.0, 0.1, ..., 1.0 fractiles of the PC frequency distribution. Other measures included employer profit, employer profit per worker, standard difficulty, and bonus per unit over standard. Standard difficulty was measured directly for unit measure contracts and seven times the number of orders for order measure contracts. Bonus per unit over standard was measured directly for unit measure contracts and 1/7 times the bonus per order over standard for order measure contracts.

## RESULTS

### *Preliminary analyses*

Tables 1 and 2 present each employer's contract offer by period, along with the number of attracted workers and profit earned or loss incurred, for markets 1 and 2, respectively. Table 3 presents descriptive data regarding outcomes on consummated contracts for each market and overall. Table 4 presents descriptive data on worker risk preferences.

As a preliminary to hypotheses testing, the following conclusions may be drawn from the data presented in Tables 1–4. First, employers generally specified standards greater than zero in their contract offers. For market 1, *all* contract offers

TABLE 1. Contract offers, attracted workers, profit — market 1 (all prices in dollars)

| Employer | Period 1 |        |      |    |       | Period 2 |        |      |    |       | Period 3 |        |      |    |       |
|----------|----------|--------|------|----|-------|----------|--------|------|----|-------|----------|--------|------|----|-------|
|          | a        | b      | s    | n  | z     | a        | b      | s    | n  | z     | a        | b      | s    | n  | z     |
| 1        | 0.80     | 0.03*  | 45*  | 13 | 16.31 | 0.80     | 0.025* | 40*  | 1  | 1.10  | 0.85     | 0.045* | 40*  | 1  | 0.45  |
| 2        | 0.50     | 0.25†  | 12†  | 2  | 5.08  | 0.52     | 0.30†  | 13†  | 0  | 0.00  | 0.85     | 0.25†  | 10†  | 2  | 0.94  |
| 3        | 1.00     | 0.049* | 125* | 6  | 9.92  | 1.00     | 0.049* | 120* | 1  | -0.80 | 1.00     | 0.049* | 125* | 0  | 0.00  |
| 4        | 0.60     | 0.03*  | 60*  | 2  | 3.26  | 0.76     | 0.03*  | 60*  | 0  | 0.00  | 0.96     | 0.046* | 49*  | 0  | 0.00  |
| 5        | 0.70     | 0.002* | 52*  | 1  | 1.68  | 0.70     | 0.025* | 40*  | 1  | 1.08  | 0.90     | 0.03*  | 30*  | 0  | 0.00  |
| 6        | 0.35     | 0.12†  | 5†   | 3  | 6.15  | 1.00     | 0.02*  | 40*  | 0  | 0.00  | 0.90     | 0.04*  | 40*  | 0  | 0.00  |
| 7        | 0.75     | 0.10†  | 8†   | 2  | 5.75  | 0.80     | 0.10†  | 6†   | 4  | 6.29  | 0.90     | 0.10†  | 6†   | 1  | 1.51  |
| 8        | 0.90     | 0.02†  | 8†   | 1  | 1.99  | 0.85     | 0.033* | 50*  | 0  | 0.00  | 0.85     | 0.03*  | 40*  | 1  | 0.87  |
| 9        | 0.44     | 0.023* | 46*  | 0  | 0.00  | 1.00     | 0.038* | 40*  | 23 | 12.27 | 1.00     | 0.044* | 25*  | 27 | -5.95 |
| 10       | 0.65     | 0.21†  | 13†  | 1  | 2.62  | 0.83     | 0.032* | 46*  | 0  | 0.00  | 1.00     | 0.042* | 38*  | 2  | -0.39 |
| 11       | 0.50     | 0.25†  | 12†  | 1  | 1.40  | 0.70     | 0.25†  | 13†  | 2  | 5.00  | 0.85     | 0.25†  | 12†  | 0  | 0.00  |
| 12       | 0.75     | 0.035* | 5*   | 9  | 13.55 | 0.85     | 0.045* | 50*  | 10 | 9.49  | 1.00     | 0.049* | 45*  | 6  | 2.09  |

a, Salary; b, bonus for performance over standard; s, standard difficulty; n, number of attracted workers; z, employer profit.

\*Unit measure (controllability filter).

†Order measure (no controllability filter).

TABLE 2. Contract offers, attracted workers, profit — market 2 (all prices in dollars)

| Employer | Period 1 |        |      |    |       | Period 2 |        |     |    |       | Period 3 |        |     |    |       |
|----------|----------|--------|------|----|-------|----------|--------|-----|----|-------|----------|--------|-----|----|-------|
|          | a        | b      | s    | n  | z     | a        | b      | s   | n  | z     | a        | b      | s   | n  | z     |
| 1        | 0.70     | 0.04*  | 66*  | 4  | 7.40  | 0.10     | 0.031* | 5*  | 1  | 4.74  | 1.00     | 0.024* | 0*  | 14 | 2.83  |
| 2        | 0.35     | 0.015* | 0*   | 0  | 0.00  | 1.00     | 0.02*  | 10* | 19 | 18.64 | 1.00     | 0.028* | 30* | 1  | 0.64  |
| 3        | 0.50     | 0.015* | 15*  | 5  | 7.39  | 0.60     | 0.02*  | 15* | 2  | 2.00  | 0.75     | 0.02*  | 10* | 0  | 0.00  |
| 4        | 1.00     | 0.01*  | 4*   | 19 | 23.07 | 1.00     | 0.01*  | 4*  | 8  | 12.24 | 1.00     | 0.01*  | 1*  | 0  | 0.00  |
| 5        | 0.55     | 0.14†  | 15†  | 0  | 0.00  | 1.00     | 0.02*  | 15* | 1  | 3.10  | 1.00     | 0.025* | 10* | 8  | 4.05  |
| 6        | 0.57     | 0.034* | 56*  | 1  | 1.98  | 0.61     | 0.048* | 61* | 0  | 0.00  | 1.00     | 0.15†  | 6†  | 0  | 0.00  |
| 7        | 0.40     | 0.025* | 100* | 0  | 0.00  | 0.90     | 0.25†  | 15† | 0  | 0.00  | 1.00     | 0.019* | 11* | 0  | 0.00  |
| 8        | 0.70     | 0.25†  | 15†  | 0  | 0.00  | 0.85     | 0.28†  | 10† | 3  | 2.44  | 0.90     | 0.35†  | 10† | 1  | 2.60  |
| 9        | 0.76     | 0.21†  | 11†  | 1  | 3.18  | 1.00     | 0.16†  | 6†  | 3  | 2.89  | 1.00     | 0.25†  | 4†  | 11 | 0.83  |
| 10       | 1.00     | 0.20†  | 10†  | 12 | 18.15 | 1.00     | 0.22†  | 10† | 3  | 2.70  | 0.90     | 0.22†  | 9†  | 0  | 0.00  |
| 11       | 0.60     | 0.34†  | 15†  | 1  | 2.47  | 0.50     | 0.32†  | 10† | 1  | -0.50 | 0.50     | 0.34†  | 5†  | 4  | -2.70 |
| 12       | 0.55     | 0.20†  | 14†  | 0  | 0.00  | 0.90     | 0.30†  | 13† | 0  | 0.00  | 0.90     | 0.25†  | 5†  | 3  | -1.53 |

a, Salary; b, bonus for performance over standard; s, standard difficulty; n, number of attracted workers; z, employer profit.

\*Unit measure (controllability filter).

†Order measure (no controllability filter).

had a standard greater than zero, while for market 2, only one offer (in period 3) had a standard equal to zero. Second, the presence or absence of controllability filters in contract offers varied somewhat over markets. In period 1 for each market, 6/12 of the offers included a controllability filter. This proportion increased to 9/12 in periods 2 and 3 for market 1, but stayed at 6/12

for market 2. Third, workers generally chose only a few of the available offers. Averaging over periods for market 1 (2), one offer was chosen by 52% (42%) of the workers and either of two offers was chosen by 70% (65%). Fourth, for each market, the contract which attracted the most workers also yielded the highest profit in the first two periods but not in the third.<sup>6</sup>

<sup>6</sup>This result effectively nullified the between-market feedback manipulation discussed in note 3.

TABLE 3. Outcomes for consummated contracts

|                             | Main contracting periods |               |       |       |                |       |       |               |       |
|-----------------------------|--------------------------|---------------|-------|-------|----------------|-------|-------|---------------|-------|
|                             | Mean                     | First<br>S.D. | Med.  | Mean  | Second<br>S.D. | Med.  | Mean  | Third<br>S.D. | Med.  |
| Overall                     |                          |               |       |       |                |       |       |               |       |
| Salary (\$)                 | 0.82                     | 0.19          | 0.80  | 0.93  | 0.14           | 0.99  | 0.96  | 0.11          | 1.00  |
| Bonus pay (\$)              | 0.85                     | 0.67          | 0.80  | 1.44  | 0.87           | 1.46  | 2.39  | 1.35          | 2.16  |
| Total pay (\$)              | 1.66                     | 0.65          | 1.61  | 2.34  | 0.89           | 2.37  | 3.25  | 1.45          | 3.16  |
| Salary/total pay (%)        | 0.57                     | 0.26          | 0.52  | 0.45  | 0.20           | 0.40  | 0.36  | 0.21          | 0.32  |
| Standard difficulty         | 50.9                     | 47.4          | 49.4  | 33.2  | 24.3           | 39.9  | 23.4  | 16.5          | 25.3  |
| Bonus per unit (\$)         | 0.026                    | 0.013         | 0.029 | 0.029 | 0.012          | 0.031 | 0.037 | 0.009         | 0.036 |
| Performance                 | 76.5                     | 20.3          | 80.5  | 80.0  | 26.3           | 84.0  | 82.2  | 26.7          | 84.5  |
| Performance-incentive (\$)  | 1.20                     | 0.56          | 1.03  | 1.90  | 0.65           | 1.92  | 2.92  | 0.60          | 2.79  |
| General attractiveness (\$) | 1.43                     | 0.54          | 1.27  | 1.76  | 0.38           | 2.02  | 2.39  | 0.43          | 2.59  |
| Profit per worker (\$)      | 1.53                     | 0.59          | 1.45  | 0.92  | 0.64           | 0.90  | 0.07  | 0.94          | -0.16 |
| Market 1                    |                          |               |       |       |                |       |       |               |       |
| Salary                      | 0.75                     | 0.17          | 0.77  | 0.92  | 0.10           | 0.98  | 0.98  | 0.05          | 1.00  |
| Bonus pay (\$)              | 0.88                     | 0.72          | 0.84  | 1.45  | 0.92           | 1.51  | 2.49  | 1.11          | 2.30  |
| Total pay (\$)              | 1.60                     | 0.68          | 1.51  | 2.37  | 0.94           | 2.26  | 3.32  | 1.28          | 3.29  |
| Salary/total pay (%)        | 0.56                     | 0.29          | 0.44  | 0.46  | 0.23           | 0.38  | 0.32  | 0.15          | 0.30  |
| Standard difficulty         | 67.2                     | 54.0          | 50.0  | 45.8  | 17.4           | 40.6  | 29.8  | 14.1          | 25.4  |
| Bonus per unit (\$)         | 0.031                    | 0.011         | 0.030 | 0.037 | 0.009          | 0.038 | 0.043 | 0.006         | 0.044 |
| Performance                 | 77.4                     | 19.2          | 81.0  | 78.0  | 30.0           | 83.5  | 85.1  | 25.5          | 86.5  |
| Performance-incentive (\$)  | 1.30                     | 0.75          | 1.82  | 2.17  | 0.71           | 2.51  | 3.21  | 0.68          | 3.56  |
| General attractiveness (\$) | 1.51                     | 0.80          | 1.47  | 1.74  | 0.38           | 2.02  | 2.50  | 0.52          | 2.82  |
| Profit per worker (\$)      | 1.59                     | 0.48          | 1.44  | 0.82  | 0.68           | 0.73  | -0.03 | 0.44          | -0.20 |
| Market 2                    |                          |               |       |       |                |       |       |               |       |
| Salary (\$)                 | 0.89                     | 0.19          | 0.99  | 0.94  | 0.18           | 0.99  | 0.94  | 0.15          | 0.99  |
| Bonus pay (\$)              | 0.83                     | 0.63          | 0.74  | 1.43  | 0.83           | 1.44  | 2.30  | 1.55          | 2.03  |
| Total pay (\$)              | 1.71                     | 0.62          | 1.68  | 2.31  | 0.86           | 2.37  | 3.18  | 1.60          | 3.02  |
| Salary/total pay (%)        | 0.58                     | 0.24          | 0.55  | 0.45  | 0.17           | 0.41  | 0.39  | 0.26          | 0.32  |
| Standard difficulty         | 34.7                     | 33.1          | 15.0  | 20.7  | 23.9           | 10.1  | 17.0  | 16.4          | 10.6  |
| Bonus per unit (\$)         | 0.020                    | 0.012         | 0.015 | 0.021 | 0.009          | 0.020 | 0.031 | 0.008         | 0.025 |
| Performance                 | 75.7                     | 21.5          | 76.0  | 82.1  | 22.2           | 84.0  | 79.4  | 27.9          | 83.5  |
| Performance-incentive (\$)  | 1.11                     | 0.27          | 1.02  | 1.63  | 0.44           | 1.83  | 2.64  | 0.33          | 2.55  |
| General attractiveness (\$) | 1.35                     | 0.27          | 1.27  | 1.79  | 0.39           | 2.03  | 2.28  | 0.29          | 2.41  |
| Profit per worker (\$)      | 1.48                     | 0.69          | 1.54  | 1.02  | 0.58           | 1.02  | 0.16  | 1.24          | 0.08  |

Fifth, key outcomes improved over time for workers and worsened for employers. Salary, bonus pay, standard difficulty and bonus per unit over standard improved significantly from the workers' perspective, while employer profit per worker approached zero. Median general attractiveness increased by more than 100%, mostly in the form of bonus pay in light of the apparent

ceiling effect for salary. Median total pay increased by 96%, even though median performance increased by only 5%. Median employer profit per worker decreased by 95%. Workers' total pay as a percentage of cash paid to subjects (i.e. workers' total pay plus employers' profits) was 49%, 74% and 100% in periods 1, 2 and 3, respectively, for market 1. The corresponding

TABLE 4. Worker risk preferences

|                      | Pre-test | Post-test |
|----------------------|----------|-----------|
| RISK1 (frequencies): |          |           |
| Category 1           | 13       | 14        |
| Category 2           | 42       | 45        |
| Category 3           | 20       | 23        |
| Category 4           | 10       | 2         |
| Category 5           | 1        | 2         |
| RISK2:               |          |           |
| Mean                 | \$60     | \$61      |
| S.D.                 | \$35     | \$35      |
| Median               | \$63     | \$60      |

NB. The RISK1 categories are distinguished as follows: let  $L$  denote the reference lottery of (\$100, 0.50; \$0, 0.50). Category 1 — preference of  $L$  over \$50; Category 2 — preference of \$50 over  $L$  and  $L$  over \$25; Category 3 — preference of \$25 over  $L$  and  $L$  over \$12.50; Category 4 — preference of \$12.50 over  $L$ ; Category 5 — inconsistent preferences.

percentages for market 2 were 54%, 66% and 95%.

Sixth, the markets were very similar with respect to most outcomes. The amounts of salary, bonus pay, total pay and employer profit per worker were about the same. However, standard difficulty and bonus per unit over standard tended to be higher for market 1. Another market difference involved the proportion of workers choosing contracts with controllability filters. For market 1, the proportion was 31/41 (76%), 36/42 (86%) and 37/40 (93%), in periods 1, 2 and 3, respectively. For market 2, the corresponding proportions were 29/43 (67%), 31/41 (76%) and 23/42 (55%).

Seventh, despite the markets' overall similarities, each evolved somewhat idiosyncratically depending on the attribute values of the most successful contract in period 1. Consider first market 1. In period 1, employer 1 earned \$16.31 by attracting 13 out of 41 workers with a contract having a controllability filter, moderate standard and bonus, and a reasonably high salary. In period 2, employer 9 earned \$12.27 by attracting 23 out of 42 workers with a contract

having a controllability filter, slightly more attractive standard-bonus combination, and maximum salary. In period 3, employer 12 had the highest profit (\$2.09), even though only six workers were attracted by his or her contract, which had a controllability filter, moderate standard, maximum bonus and maximum salary.<sup>7</sup> Turning to Market 2, in period 1, employer 4 earned \$23.07 by attracting 19 out of 43 workers with a contract having a controllability filter, low standard and bonus, and maximum salary. In period 2, employer 2 earned \$18.64 by attracting 19 out of 41 workers with a contract having a controllability filter, slightly higher standard, higher bonus, and maximum salary. In period 3, employer 5 had the highest profit (\$4.05), even though only eight workers were attracted by his or her contract, which had a controllability filter, the same standard as that in employer 2's offer in period 2, a slightly higher bonus than that in employer 2's offer in period 2 and maximum salary. These results suggest that, when designing offers for a given period, at least some employers considered the attribute values of the most successful contract in the prior period.

Finally, there was a strong tendency towards worker risk aversion. RISK1 indicated varying degrees of risk aversion for more than 80% of the workers. There was a significant association between the pre-test and post-test RISK1 values (Spearman  $r = 0.66, p < 0.01$ ). RISK2 values on average were far below the sum of the lotteries' expected values (\$130). There was a significant association between the pre-test and post-test RISK2 values ( $r = 0.71, p < 0.01$ ).<sup>8</sup>

### Hypotheses tests

*Performance standards.*  $H_1$  predicted a positive association between workers' PC levels and standard-based performance incentives in the

<sup>7</sup>In period 3, 27 out of 40 workers chose employer 9's contract probably because it was too attractive. Employer 9's maximum possible profit given this contract was zero.

<sup>8</sup>Because of inherent limitations in measuring risk preferences (see Hershey *et al.*, 1982), the role of the risk preference data is confined to substantiating the assumption of worker risk aversion (cf. Waller & Chow, 1985).

contracts they choose. To test  $H_1$ , a Pearson correlation coefficient for a worker's PC and his or her chosen contract's performance incentive was computed over all workers for each main contracting period. The correlations were 0.24 ( $p < 0.02$ ), 0.23 ( $p < 0.02$ ) and 0.18 ( $p < 0.05$ ), for periods 1, 2 and 3, respectively.<sup>9</sup> Although low, these correlations are consistent with  $H_1$ . In addition, the approximate equality of the correlations over periods suggests that there was little learning by workers with respect to matching their PC and chosen contract's performance incentive. Finally, the large number of contract offers with a standard greater than zero indicates that employers relied heavily on standards when designing performance-incentive contracts.

**Controllability filters.**  $H_2$  predicted that mean pay is lower for workers choosing contracts with controllability filters, other things equal. This hypothesis is contingent on two conditions: (1) the market is at or near equilibrium and (2) there is a non-trivial variation in the presence or absence of controllability filters among chosen contracts. The first condition was approximated for each market in period 3 when employer profit per worker was about zero. However, focusing on period 3, the second condition was approximated only for market 2 where 23 (19) workers chose contracts with (without) a controllability filter. Accordingly, the test of  $H_2$  is confined to that case. An analysis of variance was performed using total pay as the dependent variable and the presence or absence of a controllability filter as a between-subjects factor. Three (non-independent) covariates were used: the ratio of salary to total pay to control for contract attributes other than the controllability filter, PC to control for self-selection effects, and performance to control for the effects of the state variable. The result was a significant effect due to the presence or absence of a controllability filter ( $F [1,38] = 40.23$ ,  $p < 0.01$ ). Adjusted mean total pay was \$2.74

(\$3.84) for contracts with (without) a controllability filter. These results are consistent with  $H_2$ .

**Employer contract revision.**  $H_3$  predicted that employers use a "win-stay, lose-shift" strategy for revising their employment contract offers from period to period. As noted earlier, contract revision was measured by the change in general attractiveness. Use of a "win-stay, lose-shift" strategy implies that contract revision varies directly with the difference between the general attractiveness of the most successful contract for the prior period and general attractiveness of a given employer's contract offer for the prior period. To be precise, let  $U_{ij}$  denote the general attractiveness of the contract offered by employer  $i$  in period  $j$ , and  $V_j$  denote the general attractiveness of the most successful contract in period  $j$ . Also, let  $C_{ij+1} = U_{ij+1} - U_{ij}$  and  $D_{ij} = V_j - V_{j-1}$ . Thus  $C_{ij+1}$  is the change in general attractiveness of employer  $i$ 's offer from  $j$  to  $j+1$ , and  $D_{ij}$  is the difference between the general attractiveness of the most successful contract and that of employer  $i$ 's offer in  $j$ . Use of the "win-stay, lose-shift" strategy implies a positive association between  $C_{ij+1}$  and  $D_{ij}$ . In the experiment, there were three main contracting periods ( $j = 1, 2, 3$ ). We computed the values of  $C_{i2}$ ,  $D_{i1}$ ,  $C_{i3}$ , and  $D_{i2}$ , for each employer, taking each market separately. The most successful contract for each market in period  $j$  ( $j = 1, 2$ ) was that which produced the highest profit and attracted the most workers. To test  $H_3$ , a Pearson correlation coefficient was computed for  $C_{i2}$  and  $D_{i1}$ , as well as for  $C_{i3}$  and  $D_{i2}$ . The correlation between  $C_{i2}$  and  $D_{i1}$  was 0.43 ( $p < 0.02$ ), and the correlation between  $C_{i3}$  and  $D_{i2}$  was 0.64 ( $p < 0.01$ ).<sup>10</sup> These results are consistent with  $H_3$ .

## DISCUSSION

The purpose of this paper was to report an experiment on the role of accounting variables in

<sup>9</sup>The corresponding Spearman correlation coefficients were 0.20 ( $p < 0.04$ ), 0.27 ( $p < 0.01$ ) and 0.20 ( $p < 0.04$ ).

<sup>10</sup>The corresponding Spearman correlation coefficients were 0.24 ( $p < 0.13$ ) and 0.35 ( $p < 0.05$ ).

performance-incentive contracts. Unlike previous behavioral studies in the area, subjects in the experiment interacted as competing employers and workers over a series of contracting periods. This procedure made it possible to examine the process by which accounting-based performance-incentive contracts were produced under conditions of information asymmetry and state uncertainty, as well as providing new tests replicating the previous studies. Before discussing the results, it should be emphasized that care must be taken when generalising from laboratory to field settings (for a discussion, see Swieringa & Weick, 1982). This study's experiment involved a generic task and setting that were designed to represent certain key attributes of employment relations (e.g. standards, controllability filters and monetary rewards), while omitting many others (e.g. non-monetary rewards, collective bargaining and worker performance history). Whether the omitted attributes in field settings would offset or amplify the effects observed in the experiment is an empirical question which cannot be resolved here.

The inclusion of competing employers and multiple periods had major effects. Competition among employers produced significant improvements over time in the general attractiveness of contract offers, to the extent that the workers' share of the "economic pie" went from about 50% in period 1 to about 100% in period 3, despite only a small increase in actual performance. Thus, workers appeared to benefit considerably from incentive contracting under competitive conditions. An interesting issue for future research is the relative performance (in terms of both efficiency and distribution) of performance-incentive contracts vs fixed-pay contracts under competitive conditions.

Employers' revision of contract offers in response to prior period outcomes was generally consistent with use of the "win-stay, lose-shift" strategy. This strategy helps to explain why the two markets evolved somewhat idiosyncratically. For example, standard difficulty and bonus per unit over standard tended to be higher for market 1, which may be traced back to differences between the markets' most successful

contracts in period 1. Also, there were generally more contract offers and consummated contracts with controllability filters for market 1, which may be similarly accounted for. Although the "win-stay, lose-shift" strategy is a reasonable starting point for describing how employers learn under competitive conditions, it is obviously very crude. Future research should examine further employers' decision and learning processes, especially in cases where external accounting information about competitors is not redundant with other available feedback. The role of external accounting information in the dissemination of organizational innovation (e.g. management control systems) is an important research area which is largely unexplored.

There was no evidence of learning by workers over time. A simple explanation is that there was no need for learning: the way in which performance capability translated into performance and rewards was straightforward and workers probably had accurate perceptions regarding their own performance capability even in period 1. An interesting issue for future research is the role of internal accounting information when workers have vague or incorrect pre-contracting perceptions regarding their own performance capability and/or the nature of the task. In such cases, there may be an information asymmetry in which the employer knows more than the worker about factors affecting performance, and the role of internal accounting information may be to provide feedback which facilitates the worker's learning from experience.

The roughly even distribution of contracts with and without controllability filters in market 2 permitted a test for a compensating pay differential. This differential was significant, indicating that workers valued controllability filters and were willing to accept lower mean pay in return for protection from state uncertainty. This result is consistent with the Waller & Chow (1985) finding of a stronger association between performance capability and performance incentives in chosen contracts in the presence of a controllability filter. However, any global statement about the value of controllability filters in incentive contracting would be inappropriate.



The issue of whether to shield workers' measured performance from uncontrollable factors is complex, and future research should attempt to delineate the circumstances under which controllability filters do or do not lead to improved outcomes.

Consistent with the previous behavioral studies, there was a positive association between workers' performance capability and the standard-based performance incentives in the contracts they chose. Further, with respect to employer contract design, all but one contract offer included a standard greater than zero, which may be partially attributed to standards reducing the risk imposed on workers compared with pure linear contracts. However, because a performance standard and controllability filter often appeared in the same contract offer, use of standards cannot be explained solely in terms of protecting workers from state uncertainty. Some employers perhaps thought that higher standards would lead to higher performance, other things being equal (cf. Locke *et al.*, 1981). But, the overall tendency was to link the bonus per unit over standard with standard difficulty. An alternative explanation is that employers used standard-based rather than pure linear contracts because workers with lower performance capability were less likely to select the former type of contract.

Additional issues for future research include the following. First, different general contract forms and ranges of attribute values might be used. For example, the possible range of salary might be extended in both directions, to elimi-

nate the apparent ceiling effect observed in the experiment and to introduce the possibility of "renting the firm" to the worker. The effects of long-term contracts which take into account worker performance history or reputation also could be examined. Second, environmental conditions might be varied by, for example, allowing employers to limit the number of workers choosing their offers, allowing employers to substitute capital for labor or introducing imperfect competition into the product market. Third, research in behavioral decision-making (see Kahneman *et al.*, 1982) has demonstrated that individual behavior often does not conform to normative decision theory: individuals use simplifying heuristics that sometimes lead to systematic biases. Future research might extend the heuristic-and-bias paradigm into the incentive contracting area. Fourth, unlike the behavioral approach taken here, experimental economics' methods might be employed (for discussions, see Smith, 1982; Smith *et al.*, 1987). However, experimental economics rely heavily on theory for purposes of experimental design and generalization of results. The state of economic theory as it relates to internal accounting is not yet rich enough to be rigorously applied to settings as complex as that in this study's experiment. Finally, the effects of other internal accounting variables (e.g. allocated costs, direct participation in standard setting, variance investigation and income-smoothing strategies) on performance-incentive contracts might be examined.

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## THE IMPACT OF PRIOR WORKING PAPERS ON AUDITOR EVIDENTIAL PLANNING JUDGMENTS\*

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### Abstract

There has been significant concern in auditing about the effects of relying on prior working papers in planning audit procedures ("anchoring"). This study employed an experiment with varying information sets: prior working papers, current year information and "scenario" (summarized prior year information). Practicing auditors were asked to design a substantive audit program for a case where changes in the client's environment dictated additional procedures. A consensus program from three partners was used as a bench-mark. Experimental groups were about equally adaptive to the changing environment. However, auditors provided with prior working papers demonstrated lower efficiency. The scenario group exhibited both high relative effectiveness and efficiency, while current information subjects displayed the lowest overall level of performance.

There have been significant concerns raised by audit researchers and practitioners about the potential "anchoring" effects of relying on prior working papers. The paramount danger of such reliance is the possible rote patterning of audit procedures (nature, extent and/or timing) during the current engagement as those employed in the prior period. Additionally, conclusions reached in an account area may follow those arrived at earlier.

Limited research findings (Libby, 1981) support the belief that significant reliance on prior papers may, in fact, create problems in practice. Auditors may, thus, fail in evidential planning to recognize and compensate for changes in the client's environment or systems. Anchoring may also perpetuate reliance on ineffective or inefficient audit programs or judgment errors from prior engagements. Finally, extensive reliance on prior working papers may inhibit creativity and skepticism.

However, prior working papers can also be

extremely beneficial in alerting practitioners to potential risks, errors and problems. For example, Wright & Ashton (1987) and Hylas & Ashton (1982) found that prior working papers were an excellent source of evidence identifying audit adjustments. Staff training and monitoring also require less time when prior working papers are consulted as examples of work in an account area, resulting in greater efficiency and a corresponding reduction in costs.

Therefore, the key question is whether auditors properly balance the use of prior working papers to increase efficiency and become informed of areas of exposure while not rotely following prior procedures (fixation). However, there is no empirical evidence on this issue. The purpose of this study is to examine the level of reliance on prior papers and how such reliance affects:

- (1) auditor adaptability;
- (2) audit efficiency;
- (3) the planned detection of perpetuating

\*I wish to gratefully acknowledge my appreciation for comments and suggestions provided by Professors Theodore Mock and Ronald Copeland and the participants of the Accounting Research Forum at Boston University on earlier versions of the paper.

errors; and

(4) overall effectiveness of audit programs.

The next section contains a brief review of the literature on anchoring and adjustment. The methodology for the study is then outlined, followed by the presentation of the results. The final section is devoted to a discussion of the implications of the findings for future research and practice.

### PRIOR RESEARCH FINDINGS

A consistent finding in the Human Information Processing (HIP) literature is that decision-makers reach judgments that significantly deviate from normative models in complex decision settings, such as an audit.<sup>1</sup> In an attempt to explain these findings, Tversky & Kahneman (1974) posit that individuals employ heuristic strategies ("rules of thumb") in order to reduce the cognitive strain of making judgments in such situations. Of particular relevance to the proposed study is the heuristic rule of "anchoring and adjustment," the tendency to establish some initial starting point (e.g. prior experience) and then make adjustments from this anchor in light of additional data. HIP research has found that decision-makers normally respond to change in the appropriate direction (manner) but that anchoring frequently inhibits the individual from fully adapting to the proper extent (Tversky & Kahneman, 1974).

There have been a limited number of recent studies on the existence of anchoring among auditors. The findings provide initial evidence that anchoring may be a problem.

Mock & Turner (1981) examined the judgments of audit seniors and supervisors in establishing sample sizes for audit procedures in the revenue cycle. The results revealed that, for three of the four procedures studied, subjects provided with initial planned sample sizes exhibited a significant anchoring effect as compared

to a control group. Subsequent rationale memos<sup>2</sup> and a protocol analysis also demonstrated the existence of anchoring.

Kinney & Uecker (1982) also found the presence of anchoring in analytical review and compliance testing settings. Consistent with anchoring, auditors provided with higher book values established a higher investigation range than those given lower book values. Auditors were also presented the results of a compliance test and requested to estimate the population error rate using either the fractile assessment or the risk assessment method. As hypothesized, participants employing the fractile assessment method anchored on the sample error rate and committed greater type II errors than the other group. Consequently, Kinney & Uecker suggest that analytical review bounds should be set *prior* to examining book values and the risk assessment method be employed in analyzing compliance sample results.

Joyce & Biddle (1981) conducted a series of experiments to test for the presence of anchoring in audit judgments. The first experiments asked auditors to assess the likelihood of significant management fraud among clients audited by Big Eight firms. The estimated incidence of fraud generally increased with higher suggested base rate anchors. In the second experiments, subjects were required to plan the extent of substantive testing. The direction in the strength of internal controls was varied: weaker to stronger, stronger to weaker. Appropriately, subjects indicated more audit work was needed when controls were weaker and vice versa. However, a significant order by internal control interaction was found, suggesting auditors consider the trend (pattern) in controls. For example, when controls became stronger, there was a reluctance to reduce testing. Two final experiments required auditors to assess the likely success of a new product introduction needed by a client to remain a going concern, followed by a decision on the nature of the appropriate opinion (un-

<sup>1</sup>For extensive reviews see: Psychological research: Slovic & Lichtenstein (1977); Slovic *et al.*, (1977). Accounting research: Libby & Lewis (1982); AAA (1977).

<sup>2</sup>"Rationale memos" are explanations by auditors justifying a judgment arrived at, such as sample size selection.

qualified, qualified, disclaimer). Experimental groups varied as to the nature of product success (a conjunctive vs a disjunctive event) and response mode (probability of product success or product failure). Auditors appropriately set lower probability assessments for the conjunctive product introduction across both response modes. However, subjects exhibited considerable variation in arriving at a qualitative audit opinion from a quantitative probability assessment.

Joyce & Biddle conclude that anchoring was present in the first set of experiments assessing management fraud, but was not clearly exhibited in the other two. They suggest that the familiarity of the subject with the task and the existence of other heuristics may explain the results.

### RESEARCH QUESTIONS

The prior research findings thus suggest the existence of the anchoring and adjustment heuristic by auditors across various decision settings. However, task familiarity/complexity and reliance on other heuristics may moderate and/or dominate the anchoring effect. Importantly, none of the prior studies examined the influence of anchoring on the planning of substantive audit procedures, the focus here. The effectiveness and efficiency of an audit largely rest with the nature of the evidence gathered (Wright & Mock, 1985).

The research questions examined in this study are as follows:

- Q1 Do prior working papers inhibit auditors from properly adapting procedures to meet changing client conditions?
- Q2 Will auditors relying on prior working papers routinely continue to perform unnecessary, ineffective procedures conducted in the prior year?
- Q3 Will auditors not alerted to errors reflected in the prior engagement fail to gather evidence to detect such errors?

The first two questions focus on potential dysfunctional effects of consulting prior working

papers while the third question explores the magnitude of the beneficial informational value of prior audit results in alerting auditors to potential errors. Question 1 focuses on the anchoring effect of prior working papers on the adaptability of auditors and is, thus, an audit effectiveness issue. The second question relates to potential efficiency problems in perpetuating weak audit programs. Lastly, the final research question deals with audit effectiveness. That is, the likelihood that the auditor will plan tests to uncover the reoccurrence of prior errors (likely risks). Effectiveness is widely considered of paramount importance in auditing, since the discovery of material misstatements is the principal objective of planned procedures. Thus, Q1 and Q3 are of greatest concern; however, audit efficiency (Q2) is also of great importance in the currently competitive environment of public accounting. The methodology employed to address these questions is described in the next section.

### METHODOLOGY

#### *The instrument and task*

This study entails an experiment in which auditors are asked to design a substantive audit program for the inventory account of a publicly held, medium-sized manufacturer of water heaters ("Modern Appliances Manufacturing Company"). The inventory was selected for study because of its materiality in many audits and the high incidence of significant errors and complexities in this area (Hylas & Ashton, 1982).

The case entails a realistic, rich setting for the task and is divided into nine parts:

1. Background information on the company and comparative financial data
2. Description of the inventory and warehousing cycle (with a systems flowchart)
3. Summary of the internal control evaluation
4. Nature and results of compliance tests
5. Prior year trial balance and adjusting entries
6. Prior year substantive audit program
7. Prior year detailed supporting schedules and conclusions

8. The task
9. Debriefing and demographic questions.

The full case, thus, provides auditors with the information normally available in practice prior to finalizing a substantive audit program and a complete set of prior working papers. To ensure that the case was realistic and complete, careful formulation and pilot testing was conducted. After the initial case was developed, an audit supervisor was consulted on four 2-hour occasions to refine the prior year audit program and working papers and to enhance the realism and completeness of the case. The instrument was then pilot tested with five seniors from a different firm than the supervisor. The supervisor was consulted once again to help incorporate the results of the pilot test. Thus, as a result of these efforts, the prior year audit program appears to be cost-effective.<sup>3</sup> Additionally, as will be discussed in a subsequent section of the paper, the consensus of three audit partners was that all procedures were necessary. (A copy of the instrument is available upon request.)

The case begins by describing the client's financial history and trends in the industry. The company has been audited for the past 12 years. Modern Appliances has experienced strong growth over the last decade but has lower sales and profits in the current year because of the introduction by a major competitor of a series of energy efficient water heaters and a decline in housing and construction starts due to high interest rates. Ratios presented in the case (preliminary analytical review) reveal slower moving, potentially obsolete inventory, especially for the larger water heaters for commercial sale. Thus, the case is designed to reflect potential material problems, requiring a change in audit procedures from those of the prior year. Specifically, greater attention is needed to observe obsolete inventory. The need for an inventory allowance or write-down should also be discus-

sed with management. Finally, additional testing of the lower-of-cost-or-market is warranted. An important empirical question is whether auditors will adapt to these changes by revising procedures or anchor on prior working papers.

### *Experimental groups*

Subjects were randomly assigned to three experimental groups provided with different information sets. Figure 1 indicates how the information varied between groups. The "current information" group only received data on the current engagement (parts 1–4 of the case). Therefore, these respondents do not have a prior year anchor to rely on in designing substantive tests.

An intermediate information set is explored in the "scenario" group. Here, auditors were provided all of the current year's information plus an overview of the results of the prior year's audit (the trial balance and adjusting entries). This limited prior year data highlights the key accounting errors found, without providing the detailed audit program or the supporting schedule conclusions. There were two prior year audit adjustments related to inventories: a cut-off error for goods purchased in transit; and a misallocation of corporate overheads to manufacturing, inflating the overhead rate and inventory balances. Knowledge of these errors is valuable in suggesting current procedures to test whether the errors reoccurred. Several studies have demonstrated that errors are likely to be perpetuated (Kinney, 1981; Hylas & Ashton, 1982). The cut-off error is quite common while the overhead allocation problem is less likely and consequently harder to detect.

Lastly, the "full information" group received all parts of the case (current and prior year working papers). To test audit efficiency, a subgroup ( $n = 9$ ) received a slight variation in the prior year audit program. Two additional steps were added which were designed to be unnecessary

<sup>3</sup>In the debriefing phase of the experiment, subjects were asked a series of questions on their perceptions of the level of realism in the case. Participants believed that case descriptions, prior working papers, and the task were realistic [overall mean 2.6 on a scale of 1 (highly realistic) – 5 (highly unrealistic)]. There were also no significant differences ( $p < 0.05$ ) in perceptions between the experimental groups (Kruskal-Wallis tests).

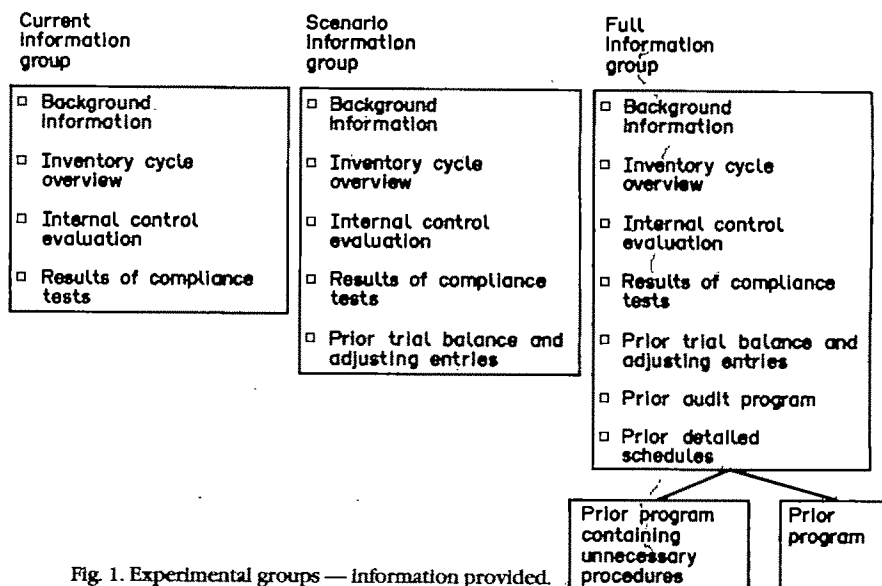


Fig. 1. Experimental groups — information provided.

procedures.<sup>4</sup> All participants in the pilot test and the coordinating supervisor agreed that these steps were of no benefit.

### Subjects

Thirty-six auditors from four national CPA firms participated in the experiment on an availability basis. Table 1 provides demographic data on the subjects. Participants had extensive audit experience (mean 3.8 years) and were at the in-charge or higher levels. Experienced auditors were sought, since the task in this study (the design of audit programs) is performed in practice by such individuals. The participation of four firms was sought to obtain a representation of auditors across firms, thus enhancing the generalizability of the findings. Importantly, significant ( $p < 0.10$ ) differences were not found between the experimental groups as to staff level.

The experiment was administered during normal business hours at each firm. Subjects

were allowed to take whatever time was needed to complete the task (the average time was 45–60 minutes). Auditors were to work independently, and all responses were anonymous. Finally, participants were notified that they would receive a summary of the findings of the project.

### Audit effectiveness

Ideally, an assessment of audit program effectiveness would be highly desirable, i.e. which experimental group designed the “best” program to detect material errors? Unfortunately, the normatively “correct” substantive program cannot be determined in an audit engagement. As a surrogate, three highly experienced audit partners were consulted, one from each of three national CPA firms. These partners had 14, 16 and 20 years of auditing experience, respectively.

A delphi approach was employed to develop a “consensus program” as a benchmark to compare subject responses against. Partners were first requested to independently develop a sub-

<sup>4</sup>The unnecessary procedures were randomly placed in the prior audit program. These tests were:

(1) To test the costs assigned to work in process at 12/31, trace a sequence of material requisitions near year end to job cost sheets and ultimately to the inventory pricing of uncompleted jobs per the physical count. Also, trace a sample of labor distribution summaries near year end in the same manner.

(2) To examine the activity of transactions in work in process during the year by tracing all entries to detailed reports; e.g. reconciling monthly totals of labor costs to weekly labor distribution summaries. Foot the account entries.

TABLE 1. Demographic data

|                              | Experimental groups |          |          |           |
|------------------------------|---------------------|----------|----------|-----------|
|                              | FI                  | SI       | CI       | Aggregate |
| Number of subjects by firm:  |                     |          |          |           |
| No. 1                        | 2                   | 2        | 2        | 6         |
| No. 2                        | 4                   | 2        | 2        | 8         |
| No. 3                        | 7                   | 4        | 3        | 14        |
| No. 4                        | <u>4</u>            | <u>2</u> | <u>2</u> | <u>8</u>  |
|                              | 17                  | 10       | 9        | 36        |
| Staff level (%) <sup>a</sup> |                     |          |          |           |
| Senior                       | 71%                 | 50%      | 71%      | 66%       |
| Supervisor                   | 29%                 | 50%      | 29%      | 34%       |

Note: experimental groups:

FI = full information: subgroups, (1) prior working paper ( $n = 8$ ), (2) prior working papers containing unnecessary procedures ( $n = 9$ ).

SI = scenario information.

CI = current year information.

<sup>a</sup> $\chi^2 = 5.68$ ;  $p = 0.22$ .

stantive audit program for the case. Partners were well aware of the purpose of the study and the concerns of anchoring and were provided all materials of the case. Partners were further encouraged to consult colleagues or other sources they deemed necessary to develop a complete, cost-effective audit program for Modern Appliances.

The initial programs from each partner were then distributed among themselves. Partners were asked to thoroughly consider the program of the other partners and to revise their initial procedures as needed. The final programs were aggregated into an overall consensus program, reflecting procedures that two or more of the partners designated. This program contains 28 procedures (19 unanimously selected). Five of the procedures were designed to respond to the environmental changes in the case and were not performed in the prior year. These new procedures, referred to as "critical" steps, appear necessary to appropriately adapt to client changes.

It is recognized that the consensus program employed here cannot be demonstrated to be normatively "correct." A common research problem in auditing is the lack of normative solutions (Biggs, 1984). However, the use of a carefully formulated program provides a much needed vehicle to assess audit effectiveness. It is

this researcher's contention that, despite the absence of a clear normative audit program, audit effectiveness cannot be ignored and must be evaluated with the most appropriate means available.

#### *Coding of responses*

The focus of this study is the choice of substantive audit procedures. In the pilot study participants listed the desired procedures in an open-ended fashion. Subsequent content analysis was thus difficult and time-consuming. Also, many "standard", widely recognized inventory procedures were noted by all of the auditors, such as observing the physical count.

To increase the accuracy and efficiency of coding, the scenario and current information groups were provided with a "preliminary" program of fourteen procedures unanimously selected by pilot study participants. The consulting supervisor and audit partners believed that these procedures would be selected by any experienced staff person on virtually all inventory audits. The case emphasized that subjects were to identify all procedures needed and were to add to or delete from this program as necessary. Subjects were also reminded that, as in practice, the engagement must be effective as well as efficient and to avoid unnecessary tests. In a similar manner, the full information group was provided

last year's program and selected any or all of these procedures. Other needed procedures were then to be written out. Providing the scenario and current information subjects with a preliminary program may have affected their responses. However, as discussed, it is believed that these procedures are standardly used in practice and would have been selected in any event.

Written audit procedures were first content analyzed by a graduate research assistant and then separately coded "blind" by this researcher. There was a 23% discrepancy rate, which is considered to be quite low according to common content analysis experience (Kerlinger, 1981). Discrepancies were then jointly discussed to determine the appropriate coding.

## RESULTS

### *Adaptability (Q1)*

The consensus program suggested that five additional "critical" procedures were necessary

in response to the potential saleability/obsolescence problems of the client's inventory. If there is a serious anchoring effect on prior year's working papers, we would expect to see the full information group fail to appropriately modify the audit program.

Table 2 identifies these new procedures and provides data on the overall frequency critical procedures were selected by the experimental groups. A one-way ANOVA revealed a significant difference in the mean number of critical procedures chosen between the three groups ( $F = 3.12$ ;  $p = 0.06$ ). The scenario group was more likely to select a greater number of these procedures than other groups. If we look at the frequency of selecting two or more (a majority) of the critical procedures, the scenario group demonstrated significantly ( $p = 0.06$ ) greater adaptability than the other auditors. However, the small difference in the mean number of planned critical procedures (0.5, i.e. less than one procedure) may not reflect a substantial "practical" concern. That is, the pattern of specific critical procedures selected was similar across

TABLE 2. Results on adaptability in audit programs

| Critical procedure                                                  | % Selecting step |     |     |
|---------------------------------------------------------------------|------------------|-----|-----|
|                                                                     | FI               | SI  | CI  |
| 1. Review and discuss need for obsolescence reserve                 | 71%              | 90% | 67% |
| 2. Check inventory for lower-of-cost-or-market                      | 47%              | 70% | 44% |
| 3. Review list of damaged/obsolete goods as to inventory procedures | 24%              | 20% | 22% |
| 4. In physical count, observe for obsolescence/damage               | 29%              | 10% | 0%  |
| 5. Check on customer returns                                        | 0                | 0   | 0   |

| Experimental groups* | Number of critical procedures selected<br>% of subjects |     |     |     |           | Mean no. procedures | Standard deviation |
|----------------------|---------------------------------------------------------|-----|-----|-----|-----------|---------------------|--------------------|
|                      | 0                                                       | 1   | 2   | 3   | 2 or more |                     |                    |
| FI                   | 12%                                                     | 41% | 29% | 18% | 47%       | 1.47                | 0.51               |
| SI                   | 0                                                       | 10% | 80% | 10% | 90%†      | 1.90‡               | 0.32               |
| CI                   | 11%                                                     | 44% | 45% | 0   | 45%       | 1.44                | 0.18               |

Note: no auditor selected more than three of the five critical procedures.

\*FI = full information, SI = scenario information, CI = current year information.

† $\chi^2 = 5.73$  ( $p = 0.057$ ); ‡ $F = 3.12$  ( $p = 0.057$ ).



groups; a majority planned steps 1 and 2, while few indicated steps 3–5.

### *Audit efficiency (Q2)*

The second research question examines whether auditors continue conducting unnecessary procedures performed in prior engagements. To test this, two ineffective procedures were included in the prior year program of one of the full information groups. Of the nine auditors in this group, only three selected the first unnecessary procedure, while none chose the second. Although the sample size here is small, these findings provide indications that auditors do not rotely adopt procedures conducted in earlier engagements. Overall, subjects appear to have demonstrated a careful assessment of evidence and a rejection of ineffective tests.

Further evidence of audit efficiency is reflected in the number of planned procedures. Table 3 indicates the mean number of total audit procedures, eliminated tests, and additional procedures for each group. The full information group selected significantly ( $p = 0.002$ ) more procedures than the others with the current group noting the fewest tests. These results suggest the prior audit program may lead to less efficiency and perhaps "over-auditing." However, a comparison to the partner consensus program is necessary to assess whether unnecessary procedures were planned. The findings on this issue are presented in a later section.

The number of eliminated procedures did not differ significantly ( $p < 0.10$ ) between the groups as shown in Table 3. Since the prior year

and preliminary programs were designed to be cost-effective, it was anticipated that few procedures would be eliminated. The results confirm these expectations.

Surprisingly, a one-way ANOVA revealed no significant differences between the groups as to additional procedures. Since the scenario and the current information groups were provided with a cursory, "preliminary" 14 step program while the full information auditors received the complete program from the prior year containing 23 or 25 steps, one would expect that full information subjects would find less need to indicate additional procedures than the other groups. However, these auditors noted as many additional tests as other participants, suggesting that perhaps redundant or unnecessary procedures may have been selected.

### *Perpetuating errors (Q3)*

An advantage in having access to prior working papers is that the auditor is alerted to errors and risk areas encountered before. As discussed, the Modern Appliances case contained two inventory audit adjustments detected in the prior year that are likely continuing problems.

Table 4 presents the results on this issue. In general, subjects selected cut-off procedure no. 1, but the scenario and current information groups chose overhead allocation tests significantly less frequently than the full information group. In examining cut-off, current information subjects surprisingly did not indicate an accompanying step (no. 2) as frequently as others. Quite unexpectedly, only 20% of scenario au-

TABLE 3. Audit efficiency

| Dependent variable                    | Mean response |               |               | One-way ANOVA<br><i>F</i> |
|---------------------------------------|---------------|---------------|---------------|---------------------------|
|                                       | FI            | SI            | CI            |                           |
| Total no. of planned audit procedures | 27.3<br>(5.4) | 20.8<br>(2.7) | 18.7<br>(2.8) | 14.41*                    |
| No. of eliminated procedures          | 4.1<br>(3.7)  | 1.9<br>(2.2)  | 3.6<br>(2.8)  | NS                        |
| No. of additional procedures          | 8.4<br>(3.6)  | 8.7<br>(2.1)  | 8.2<br>(3.1)  | NS                        |

\* $p = 0.0001$ .

Notes: (1) numbers in parentheses are standard deviations;

(2) only significant results ( $p \leq 0.10$ ) are noted.

TABLE 4. Perpetuating errors

| Audit procedures                                                                                                                               | % of subjects selecting procedure |      |      |          |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|------|----------|
|                                                                                                                                                | FI                                | SI   | CI   | $\chi^2$ |
| Cut-off:                                                                                                                                       |                                   |      |      |          |
| (1) For later cut-off tests, record numbers of last receiving reports, requisitions, finished goods, receipts and bills of lading.             | 88%                               | 100% | 100% | 3.6      |
| (2) Determine proper cut-off by examination of transactions around the inventory date, using information gathered during physical observation. | 88%                               | 70%  | 22%  | 12.78*   |
| Overhead determination: review allocations of administrative costs to production.                                                              | 75%                               | 20%  | 11%  | 13.55*   |

\*Significant,  $p = 0.01$ .

ditors, aware of the prior year overhead error, planned an appropriate procedure to examine for this problem in the current year. This curious finding will be discussed further in the final section of the paper.

#### *Evidential choices as compared to the consensus program*

To evaluate audit effectiveness, the procedures selected by participants in each experimental group are compared to the consensus program developed by the experienced partners consulted. Since the relative normative importance of each procedure is not determinable, the steps are considered to be equally weighted. Setting audit efficiency aside, the empirical question is what percentage of the audit procedures in the consensus program were selected by each participant? The findings for each group are noted below:

|                      | <i>% of consensus program</i> |
|----------------------|-------------------------------|
| Full information     | 73%                           |
| Scenario information | 69%                           |
| Current information  | 50%                           |

A one-way ANOVA revealed a significant difference between the groups ( $F = 8.05$ ;  $p = 0.001$ ). As indicated above, the CI group performed the poorest. A series of Scheffe paired comparison tests showed no significant differences ( $p \leq 0.05$ ) between the other experimental groups.

The consensus program can also be employed to evaluate audit efficiency. Procedures selected that are not contained in the consensus program are of questionable value and may suggest unnecessary and/or redundant tests. Table 5 reports the findings on this issue. The results indicated that the prevalence of questionable tests is significantly greater for the full and current in-

TABLE 5. Potentially unnecessary/redundant tests

| Experimental groups  | No. of questionable tests | $F$ value               | Questionable tests/total tests | $F$ value               |
|----------------------|---------------------------|-------------------------|--------------------------------|-------------------------|
| Full information     | 6.8                       | 8.14<br>( $p = 0.001$ ) | 24.5%                          | 5.99<br>( $p = 0.006$ ) |
| Scenario information | 2.0                       |                         | 10.0%                          |                         |
| Current information  | 5.1                       |                         | 28.2%                          |                         |

Note: "questionable" audit tests are procedures not contained in the consensus program. Questionable tests/total tests provides a relative measure of the proportion of the full audit program containing apparently unneeded tests.

formation groups than for the scenario group. Thus, the scenario approach appears to yield greater efficiency in reducing the incidence of unneeded procedures ("over auditing").

## DISCUSSION AND CONCLUSIONS

The overall results suggest that access to prior working papers does not appear to create a serious anchoring effect impeding audit effectiveness. Subjects in the full information group were seemingly aware of changes in the client's environment and were about as adaptive as other auditors in making needed changes in the audit program. Auditors were also discriminating in considering the effectiveness of prior procedures and did not routinely select weak tests employed in the prior engagement. Further, in comparison to the benchmark consensus program, the full information group was as effective in selecting designated procedures as other subjects. Finally, auditors consulting prior working papers were alerted to prior errors and were more likely than others to plan tests to search for the reoccurrence of errors, which has been found to be prevalent in practice.

These primary findings appear to corroborate the results of Joyce & Biddle (1981) discussed earlier. In a complex, familiar task, such as the design of substantive programs studied here, auditors do not exhibit simple anchoring effects but are able to apparently identify "patterns" (schema) in the environment, which dominate this effect and may cause other heuristics or judgment rules to come into play.

Reliance on prior working papers did, however, appear to adversely effect audit efficiency. The full information groups planned significantly more procedures than other subjects and selected a larger number (%) of tests that were not included in the consensus program than did the scenario group.

Overall, the current information group displayed the lowest levels of both effectiveness and efficiency. Not only did this group plan (on average) only 50% of the consensus program but also these participants selected the highest

percentage (28.2%) of questionable procedures not contained in the consensus program. These striking results underscore that prior working papers do seem to play a key role in alerting auditors to potential problems and providing a base understanding of the client. The difficulties of auditing a new client are widely known and serve to conceptually corroborate the findings here of efficiency/effectiveness problems in not having prior audit evidence to rely on. Thus, in terms of extremes, providing full access to all prior working papers appears clearly preferable to providing no access at all.

The results for the scenario group were encouraging, in that these auditors achieved the highest relative levels of both audit efficiency and effectiveness. The one curious finding was that the scenario group was unlikely to test for the reoccurrence of the overhead allocation error. Perhaps these auditors felt the likelihood of this error being repeated was remote and that procedures in this area were thus not cost justified. Future research on auditor evidential planning for *various types of prior errors* may provide additional insights on the plausibility of the proposed explanation for this unexpected finding.

The overall promising findings for the scenario group suggest that this intermediate information set is worthy of further experimentation by CPA firms and researchers. Perhaps the scenario approach can yield the optimal balance of efficiency and effectiveness desired.

However, it is recognized that the scenario approach is not without practical problems. Not allowing access to prior programs will increase staff supervision and training costs. Also the high level of legal liability currently present provides a strong incentive for auditors to consult prior substantive programs in an attempt to ensure tests were not omitted. As a compromise, perhaps the scenario approach could be utilized every 2 or 3 years to periodically provide "fresh" evidential planning judgments without the potential anchoring effects of prior working papers which appear to reduce audit efficiency. Corroborating evidence in practice and empirical research are needed to address the cost-benefit

considerations of the scenario approach.

A broader, important research issue is that, despite the critical importance of evidential planning, we know very little about how auditors actually arrive at such complex judgments. Thus, there is a need for more archival and experimen-

tal research to better understand this decision process. It would seem that decision aids could then be developed to help auditors select an optimal cost-effective portfolio of procedures to address key audit objectives.

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## MANUFACTURING CONTROLS AND PERFORMANCE: AN EXPERIMENT

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### Abstract

This paper reports the results of an experiment that tests the effects of three manufacturing controls — inventory and production (pull vs push), incentives (fixed vs contingent) and quality control (process vs output) — on performance effectiveness and efficiency. The results indicate that both incentive and quality control systems affect performance efficiency, and incentives also had a significant effect on performance effectiveness. We also hypothesized and found a significant interaction of the production/inventory control system and the quality control system on performance effectiveness and efficiency.

Dramatic changes have been occurring in manufacturing during the last decade stimulated by both new manufacturing technologies and increasing global competition (Johnson & Kaplan, 1987; Schonberger, 1986). Technologies such as computer-integrated manufacturing (CIM), flexible manufacturing systems (FMS) and just-in-time (JIT) systems have led to a much greater emphasis on simultaneously increasing product quality and reducing product costs. Most of these manufacturing methods have been developed and refined by companies that operate in Japan and the western European nations, most notably Germany, Switzerland and Sweden (Johnson & Kaplan, 1987; Clark & Kantrow, 1981; Limprecht & Hayes, 1982; Garvin, 1983), although in some cases there is a legacy to the U.S. (McMillan, 1984).

The impact of these changes has led some corporate strategists in the U.S. to turn away from a heavy emphasis on portfolio management as a way of generating value for the firm, and towards the development of new manufacturing technologies, in the hope of producing better quality products (Berton, 1986; Skinner, 1985). Changes in manufacturing technology have also been of concern to management accountants intent on developing new controls to aid in planning, motivating and controlling both worker and firm performance. Already accounting researchers are aware that the changes in manufacturing have made extant accounting-based control systems obsolete, and recently there has been a call to investigate how management accounting can be made more effective in controlling and measuring firm performance (Kaplan,

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1983, 1986; Johnson & Kaplan, 1987).

While there is abundant casual and anecdotal evidence regarding the superior performance of these new manufacturing methods (Schonberger, 1986; Abegglen & Stalk, 1985) little, if any, experimental evidence concerning the effects of differences among manufacturing control systems on performance is available. Experimentation has advantages over other research methods, such as a high degree of internal validity and greater precision regarding measurement and control. Together, these advantages enable a researcher to estimate accurately the relative effects of each independent variable on the dependent variable, which increases the effectiveness of hypothesis testing. In contrast to field research, laboratory experiments offer the advantages of economy and repeatability but with the disadvantage of lower external validity. On balance, we consider laboratory experimentation to be more effective and efficient for initial experimentation.

In this paper, we present the results of a laboratory experiment in which three manufacturing controls (inventory/production control, quality control and incentives) are varied and their effects on two measures of performance (effectiveness and efficiency) are tested. In the next section of the paper, a review of the literature is used to develop five hypotheses. Sections on the research method, the results and a discussion follow.

## LITERATURE REVIEW AND HYPOTHESES

Manufacturing performance results from the interaction of manufacturing controls and human behavior. Views differ regarding the nature of this interaction, as well as the relative

importance of each factor (Weiss, 1984). For example, Ouchi (1981) argues that the superior performance of many Japanese manufacturing firms is primarily due to social and cultural factors. In contrast, Hayes (1981), Schonberger (1982) and Wheelwright (1981) posit that it is Japanese manufacturing controls that primarily cause their superior performance. Our position is that both factors are significant causes of manufacturing performance. Many firms in the world economy are adopting the new manufacturing controls but with workers and managers from cultures distinct from the countries where the companies are located that developed the methods (Schonberger, 1982; Sease, 1985; Ansberry & Sasaki, 1985; Byrne, 1986; Levin, 1985). Thus, we believe that it is important to conduct empirical research that provides formal evidence regarding whether variation only in the manufacturing controls affects performance. Such research will increase our understanding, for example, of the impact of adopting manufacturing controls used by such firms as Toyota *when* the workers are from a non-Japanese culture.

Operations managers and systems engineers model how manufacturing controls differ among manufacturing systems (Ritzman *et al.*, 1984).<sup>1</sup> The differences include systems for inventory and production control, and quality control (Hayes, 1981; Monden, 1981). Our approach to modeling variation in performance due to manufacturing systems uses three controls — inventory and production control, quality control and incentives — to explain differences in manufacturing performance.

### *Inventory and production control systems*

Both inventory and production flows are controlled by re-order systems, which form the basis

<sup>1</sup>Research on manufacturing control systems has also been conducted by sociologists and psychologists. A goal of sociological research is to measure manufacturing technology in terms of uncertainty and interdependence and to predict organizational structure and performance as a function of them (Gerwin, 1979). Psychologists research manufacturing systems by studying the nature of an employee's job in terms of meaningfulness, responsibility, and knowledge of results and assessing how these variables affect performance and job satisfaction (Hackman & Oldham, 1975). Recently, several review articles have attempted to enrich these two streams of research by integrating them (Brass, 1985; Gerwin, 1979; Rousseau, 1977; Slocum & Sims, 1980).

of the authority to produce and resupply (Chase & Aquilano, 1985). In this paper we consider two such systems, push and pull, which are the end points on the continuum of inventory and production control systems.

Historically, most manufacturing systems (in the U.S.) operate under the *push* system (Chase & Aquilano, 1985). With this system, a forecast of demand is estimated for the product under manufacture, as well as for each subassembly. Production begins with the worker at the beginning of the assembly line producing a subassembly and *pushing* it to the work-in-process (WIP) buffer inventory accumulating between him/her and the next worker. The second worker, in turn, makes a subassembly, attaches the subassembly from the first worker and then *pushes* the combination to the buffer WIP inventory separating him/her and the next worker. This sequence continues until the subassembly reaches the end of the assembly line. In this manner, the nature of production is controlled, in part, by the level of WIP inventory accumulating between work stations. WIP acts as a cushion against inaccurate forecasting, line imbalances and inefficiencies. Another consequence of WIP inventory is that it serves to decouple workers from each other and the production goal.

In contrast, Toyota developed the *pull* (or just-in-time (JIT)) control system (McMillan, 1984). The quantity to produce is controlled by a forecast of current demand and the level of finished goods inventory (FGI). Production occurs when the FGI falls below a prespecified level. Unlike the push system, however, only a specified level of WIP buffer inventory is allowed to exist between stations. In the ideal case, the WIP buffer inventory is zero. This is consistent with the overriding JIT philosophy of viewing the accumulation of inventories negatively, and attempting to design manufacturing systems to minimize all inventories (Monden, 1981).

Under the pull system, the last worker on the assembly line dictates the pace of work. Once this worker removes a subassembly from the WIP inventory between that worker and the next-to-last worker, the latter may then begin

production of a subassembly. Thus, WIP is *pulled* through the assembly line from the end. Control of production occurs through what is known as the Kanban system (Hall, 1982; Schonberger, 1982). The Kanban system is an inventory reordering method for workers that allows them to signal between work stations when buffer WIP falls below the specified maximum level. The system is used to determine when production can begin at the preceding work station. The result is that just enough FGI is produced to meet current demand. Under the pull system, then, there is a tighter coupling between workers, and the relationship between production goals and current production is also much tighter than with the push system.

As previously stated, we are interested in the effects of inventory and production control systems on performance. We define *performance effectiveness* as the degree to which a goal is achieved; with this definition performance increases in effectiveness when the deviation from a production goal decreases. Operationally a control system should allow just enough good output to be produced to meet current demand (Chase & Aquilano, 1985). Thus, both under- and over-production reduce performance effectiveness. *Performance efficiency* is defined as producing the desired quantity of good output with the minimum amount of effort and waste. We operationalize performance efficiency as the ratio of good output to total output. Efficiency increases as this ratio approaches one.

With these definitions, it seems reasonable to assume that performance is more effective under the pull rather than the push system because the pull system is better designed to regulate the flow of production so that just enough inventory is produced as it is demanded. However, it is difficult to substantiate a direct effect of a production and inventory system on effectiveness, and particularly efficiency, without considering the way in which the quality of products produced is controlled (Schonberger, 1982). In fact, we argue below that both the efficiency and effectiveness of manufacturing performance is an interactive function of the production/inventory and quality control systems.

CALCULATED

Supporting our argument is the extensive simulation of manufacturing systems by Huang *et al.* (1983), indicating that a Pull/Kanban production/inventory control system *per se* does not result in better manufacturing performance (also see Ritzman *et al.*, 1984). Rather, it is the manufacturing environment in which that system is typically found that causes its better performance (e.g. small lot production, variable processing times, no specialized or rush sales orders).

#### *Quality control systems*

Quality control systems are used to increase the probabilities that both finished goods perform as designed and manufacturing costs are lowered by reducing waste, re-work and warranty expense. We consider there to be a continuum of quality control systems with process-based and output-based systems existing at different locations. Process-based quality control is an approach in which quality is "built into" a product by workers as it moves along an assembly line. This occurs by making each worker responsible for quality control. In contrast, under output-based quality control, a product is inspected for quality by quality control personnel when it leaves the (sub)assembly line. Quality is said to be "inspected into" a product. A quality control inspection would then result in either the re-working of a defective product or using the defective product as scrap.

Most manufacturing firms (in the U.S.) have employed a quality control system that is primarily output-based by having quality control personnel sample output and re-work of observed defectives (Juran, 1978). Hayes (1981) suggests that in many U.S. companies, there is an uncooperative relationship between production workers and quality control inspectors. Because of this, workers are apt to hide production problems and not to re-work defectives, with the result that both production efficiency and effectiveness are relatively low.

Many large firms in Japan, such as Toyota, use process-based quality control by assigning responsibility for quality control to each worker following the Jidoka system (Schonberger,

1982). Under Jidoka, all work by all workers must stop when there is a problem with production. Instead of sampling either at the end of or during the production process, *each* worker checks *every* subassembly on which he or she works to insure that there are no errors.

A second feature of the Jidoka system is that a worker is also responsible for pushing a button or pulling a cord that stops the assembly line so that (s)he can point out to co-workers where specific errors are occurring in the manufacturing of the product. Workers are encouraged to pull the cord to halt production whenever an error is detected. A consequence of this approach to quality control has been the virtual elimination of all errors in output (Hayes, 1981). It should also be noted that in these firms, workers are expected to pull the cord and workers who do so are not punished.

In contrast, in many U.S. firms, management tries very hard to avoid downtime and workers who persist in pointing out problems leading to downtime may be chastised. Worker-based process quality control results in relatively high performance efficiency (i.e. the ratio of good output to total output) because errors are detected and corrected before completion of the output. In contrast, output-based quality control has relatively lower performance efficiency because errors are not necessarily detected and corrected before the output is completed. Thus, in this latter case, a lower percentage of the total output may not be good output.

*H<sub>1</sub>: Process-based quality control results in significantly higher performance efficiency.*

Furthermore, we suggest that both performance effectiveness and efficiency are an interactive function of the production/inventory control system and the quality control system (Schonberger, 1986). For example, both efficiency and effectiveness with Pull/JIT critically depends on the quality of the WIP inventory. To be effective, Pull/JIT requires a manufacturing process that has a constant flow of WIP inventory. An important way to decrease the flow variance is to have error-free production, or at least detection and correction of errors sooner than



later in a manufacturing process, either of which is better accomplished with process-based quality control rather than output-based quality control. Thus, the potential performance benefits of Pull/JIT are only fully realized when an appropriate quality control system is also used (e.g. process-based).

The implication of this example is that performance effectiveness is an interactive function of the production/inventory and the quality control systems. The same kind of reasoning also holds as far as performance efficiency is concerned. While we predicted in  $H_1$  that process-based quality control, by itself, has a main effect on efficiency, we also expect there to be greater performance efficiency when the pull system is combined with a process-based system rather than an output-based one.

$H_2$ : Performance effectiveness is an interactive function of the production/inventory control system and the quality control system.

$H_3$ : Performance efficiency is an interactive function of the production/inventory control system and the quality control system.

### Incentive systems

The last control system in our model is the worker incentive system. A critical feature of the assembly line worker employment relationship in many large manufacturing firms are incentive systems either *contingent* on performance or those based on *fixed* pay per unit of time (Ehrenberg & Smith, 1985; Weiss, 1984; Weitzman, 1985).

Economists have demonstrated analytically that performance is better with contingent rather than fixed incentives because workers are more motivated when their compensation increases with performance, as most workers prefer more to less compensation (Baiman, 1982; Demski & Feltham, 1978). Empirical research based on economic theories provides results consistent with analytic evidence. Chow (1983)

and Waller & Chow (1985) report that performance in laboratory experiments increased as the incentives offered were more performance-based. Research in organizational behavior has also found that motivation and performance are higher under a performance contingent incentive system (Lawler, 1973; 1981).

While performance contingent incentives have been shown to affect performance, it is important that their functional form and parameter values be matched with the performance effectiveness goal. Performance effectiveness is operationalized in this study as the degree to which performance output is equal to the goal. This is consistent with the underlying philosophy of JIT manufacturing. Chase & Aquilano (1985, p. 720) express this philosophy well:

...It (the JIT system) requires the production of precisely the necessary units in the necessary quantities at the necessary time, with the objective of achieving plus or minus zero performance to schedule. It means that producing one extra piece is just as bad as being one piece short. In fact, anything over the minimum amount necessary is viewed as waste, since effort and material expended for something not needed now cannot be utilized now.<sup>2</sup>

Thus, consistent with the JIT manufacturing philosophy, a performance contingent incentive system is used that symmetrically penalizes both over- and under-production, with maximum compensation occurring when good output is equal to the goal (Young, 1985):

$$\text{Pay} = \$3.00 - \$0.15 \text{ abs } |G - A|,$$

where  $A$  = actual number of good outputs produced and  $G$  = the goal stated in terms of the number of good outputs.

$H_4$ : Performance effectiveness is significantly higher with a performance contingent rather than with a fixed incentive scheme.

$H_5$ : Performance efficiency is significantly higher with a performance contingent rather than with a fixed incentive system.

<sup>2</sup>Depending on the particular production setting, the opportunity cost of under- or over-producing relative to the performance goal may vary. Thus, the form and parameters of a compensation system designed to motivate workers to perform to meet the goal, should also be contingent on the relative opportunity cost (Ijiri *et al.*, 1968; Weitzman, 1976; Kaplan, 1982).

## RESEARCH METHOD

### *Subjects*

The subjects in the experiment were 120 undergraduates enrolled in an introductory course in management at a large state university. Each received course credit and financial compensation for participation. The subjects were randomly assigned to work teams of three and each of the 40 work teams was randomly assigned to one of eight experimental treatments.

### *Independent variables*

There were three independent variables, corresponding to the three manufacturing control systems described in the literature review. Each variable was operationalized with two levels, and a  $2^3$  between-subjects factorial design was used. The variables were operationalized in the following manner.

(1) *Inventory and production control systems.* At the start of the experiment, a buffer WIP inventory of three subassemblies was set up between work stations along the assembly line. A WIP of three was chosen after pretesting WIPs of between zero and six. The pretest indicated that a WIP of zero made the task too closely interdependent such that a reasonable flow of subassemblies was not possible. Conversely, a WIP of six created too little interdependency along the assembly line, allowing too much slack between stations. In the pull condition, no subject was allowed to produce a subassembly until the WIP level fell below three. At that time, the subject could produce so that the level of WIP was a maximum of three. However, in the push condition, subjects had no such constraint and could produce as many or as few subassemblies as they desired.

(2) *Quality control systems.* Each team was told that their goal was to manufacture 16 *good outputs*, where a good output was defined as one that would pass a final quality control inspection in which zero errors were found by an experimenter. In the worker-based quality control condition, each worker was required to stop the production line by verbally signalling to

team members when an error was detected or the process found to be incorrect. When a worker signalled, all workers had to stop until the error(s) were corrected. An experimenter always monitored production, which increased the probability that the subjects complied with the requirement. In the output-based quality control condition in which workers did not have quality control responsibility, the production line was not stopped to inspect WIP and no reworking of defective outputs was attempted by any worker. Instead, all work effort was to be directed towards producing output.

(3) *Incentive systems.* In the fixed condition, each team member was guaranteed a salary of \$3.00. In the performance contingent condition, each team member was compensated according to the following formula:

$$\text{Pay} = \$3.00 - \$0.15 * \text{abs} | G - A |,$$

where  $A$  = the actual number of good outputs that a team produced and  $G = 16$  good outputs, the performance goal.

For instance, if the team made either 14 or 18 good outputs, each member's pay would be:

$$\text{Pay} = \$3.00 - \$0.15 * 2 = \$2.70.$$

### *Dependent variables*

The following definitions and measurements of performance effectiveness and efficiency were employed. A *good output* was one that contained no flaws as determined by an experimenter. *Total output* was measured as all completed units, including defective output. *Performance effectiveness* was the absolute value of the difference between the number of good outputs made and the goal of 16 good outputs. Thus, as this value decreases, effectiveness increases. *Performance efficiency* was measured by the number of good outputs divided by total output. *Pay* was the amount of compensation received by each subject. While subjects worked in teams of three, each was given individual credit for the performance of the team as a whole and compensated in the same manner. Focusing the analysis at the individual level also allowed us to obtain more power in the tests of the hypotheses.

### *Procedure*

The experiment took place at a laboratory designed for conducting management experiments. An experimenter led each group of subjects to a room which had been arranged to include an assembly line. To minimize experimenter effects, each experimenter read instructions from a standard script. Subjects were asked to read their instructions along with the experimenter. The subjects' instructions described the task and the procedure that they were to follow in performing the task.

Subjects were seated randomly at one of the three work stations on the assembly line. In front of each subject was a model subassembly of a product, a toy castle made from Loc-Blocs. This task has been tested and used in other assembly line research (Young, 1985). The task for each subject was to put together a subassembly according to the model subassembly. Once a subassembly was completed, it could be placed into a WIP buffer so that the next person on the line could use it. The number of blocks that each subject had to assemble was balanced (during pretests) so that no subject at a particular position on the line had a more difficult or time-consuming task. The experimenter allowed adequate time for subjects to practice making their subassemblies. Following the practice period, further instructions were handed out which contained the specific instructions for each combination of the independent variables.

After answering any questions concerning the instructions, the experimenter gave a signal to begin a 12 minute production period. At the end of this period, performance was measured, pay awarded and post-experimental questionnaires were filled out.

### *Manipulation checks*

The questionnaires included three manipulation check questions for each independent variable. Subjects were asked to respond to a series of statements using the following question and rating scale, "How accurate is the statement in describing your job?" This question was scored on a seven-point Likert scale with a (1) being equal to "very inaccurate" and a (7) being equal

to "very accurate." The questions regarding the production/inventory control system manipulation were: (a) "I was highly dependent on my fellow workers," (b) "There was no limit set on the size of inventories" (negatively scored), and (c) "My work was paced by the work of my co-workers." The questions for the quality control system were: (a) "I was responsible for quality," (b) "I was not allowed to stop production" (negatively scored), and (c) "I had a great deal of control over the work flow." Lastly, the questions for the incentive system manipulation were: (a) "I was paid a fixed amount, independent of performance" (negatively scored), (b) "My pay depended on reaching our target," and (c) "My pay was reduced if we exceeded our performance target."

## RESULTS

### *Manipulation checks*

For each independent variable, the three associated manipulation check questions were summed and a *t*-test was performed. Considering the production control system manipulation, the mean difference between the push and the pull conditions was significant ( $\bar{x} = 14.43, s = 4.26; \bar{x} = 16.72, s = 3.22, t = 3.86; p < 0.01$ ) and with the expected sign. The between group difference in means was significant and in the expected direction for quality control systems ( $\bar{x} = 16.43, s = 3.96; \bar{x} = 12.95, s = 2.86$ ; for worker-based quality control and output-based quality control, respectively,  $t = 4.23; p < 0.01$ ). In the fixed incentive condition, the mean was significantly less for subjects in the fixed condition than for subjects in the contingent incentive condition ( $\bar{x} = 18.58, s = 2.53; \bar{x} = 10.62, s = 3.07, t = 5.70; p < 0.001$ ). Thus the subjects were significantly affected by the three manipulations as expected.

### *Descriptive statistics*

Tables 1 and 2 report the means and S.D. for the cells and marginals of the experimental design. Considering the cells (Table 1), the experimental cell with highest performance effective-

TABLE 1. Descriptive statistics ( $n = 15$  for each cell)

| Production and inventory control |           | Push  |       |            |       | Pull  |       |            |       |
|----------------------------------|-----------|-------|-------|------------|-------|-------|-------|------------|-------|
|                                  |           | Fixed |       | Contingent |       | Fixed |       | Contingent |       |
| Incentives                       |           | OP    |       | PB         |       | OP    |       | PB         |       |
| Quality control*                 |           | OP    |       | PB         |       | OP    |       | PB         |       |
| Total output                     | $\bar{x}$ | 15.60 | 11.20 | 16.20      | 13.80 | 15.40 | 13.60 | 14.00      | 14.60 |
|                                  | $S$       | 2.03  | 5.76  | 0.41       | 2.65  | 3.51  | 3.85  | 3.00       | 1.05  |
| Good output                      | $\bar{x}$ | 12.80 | 9.20  | 14.60      | 13.20 | 10.40 | 10.40 | 11.60      | 14.60 |
|                                  | $S$       | 1.78  | 5.57  | 1.55       | 2.57  | 4.92  | 6.09  | 5.77       | 1.05  |
| Pay (\$)                         | $\bar{x}$ | 3.00  | 3.00  | 2.79       | 2.58  | 3.00  | 3.00  | 2.49       | 2.79  |
|                                  | $S$       | 0.00  | 0.00  | 0.25       | 0.42  | 0.00  | 0.00  | 0.10       | 0.17  |
| Performance effectiveness†       | $\bar{x}$ | 3.20  | 6.80  | 1.40       | 2.80  | 5.60  | 5.60  | 4.40       | 1.40  |
|                                  | $S$       | 1.78  | 5.57  | 1.55       | 2.57  | 4.92  | 6.09  | 5.77       | 1.06  |
| Performance efficiency‡          | $\bar{x}$ | 0.82  | 0.75  | 0.90       | 0.96  | 0.64  | 0.68  | 0.78       | 1.00  |
|                                  | $S$       | 0.07  | 0.16  | 0.10       | 0.06  | 0.21  | 0.38  | 0.36       | 0.00  |

\*OP is output-based and PB is process-based quality control.

†Performance effectiveness is maximized with a value of zero, and it decreases as the value increases.

‡Performance efficiency is maximized with a value of one and minimized with a value of zero.

TABLE 2. Descriptive statistics by marginals ( $n = 60$  per marginal)

|                            |           | Production and inventory control |       | Quality control* |       | Incentives |            |
|----------------------------|-----------|----------------------------------|-------|------------------|-------|------------|------------|
|                            |           | Push                             | Pull  | OP               | PB    | Fixed      | Contingent |
| Total output               | $\bar{x}$ | 14.20                            | 14.40 | 15.30            | 13.30 | 13.95      | 14.65      |
|                            | $S$       | 3.86                             | 3.05  | 2.59             | 3.87  | 4.30       | 2.24       |
| Good output                | $\bar{x}$ | 12.45                            | 11.75 | 12.35            | 11.85 | 10.70      | 13.50      |
|                            | $S$       | 3.85                             | 5.07  | 4.17             | 4.76  | 4.94       | 3.44       |
| Pay (\$)                   | $\bar{x}$ | 2.84                             | 2.82  | 2.82             | 2.84  | 3.00       | 2.66       |
|                            | $S$       | 0.28                             | 0.49  | 0.50             | 0.27  | 0.00       | 0.52       |
| Performance effectiveness† | $\bar{x}$ | 3.55                             | 4.25  | 3.65             | 4.15  | 5.30       | 2.50       |
|                            | $S$       | 3.78                             | 5.07  | 4.17             | 4.77  | 4.94       | 3.44       |
| Performance efficiency‡    | $\bar{x}$ | 0.86                             | 0.78  | 0.79             | 0.85  | 0.72       | 0.91       |
|                            | $S$       | 0.13                             | 0.31  | 0.23             | 0.25  | 0.24       | 0.20       |

\*OP is output-based, and PB is process-based quality control.

†Performance effectiveness is maximized with a value of zero and it decreases as the value increases.

‡Performance efficiency is maximized with a value of one and minimized with a value of zero.

ness ( $\bar{x} = 1.40$ ) and efficiency ( $\bar{x} = 1.00$ ) was pull production/inventory control, with contingent incentives and process-based quality control. In contrast, the cell with the lowest per-

formance effectiveness was push production/inventory control, with fixed incentives and process-based quality control ( $\bar{x} = 6.80$ ) while the lowest performance efficiency was found in the

cell with pull production/inventory control, fixed incentive and output-based quality control ( $\bar{x} = 0.64$ ).

Total output was highest in the push, contingent, output-based quality control cell ( $\bar{x} = 16.20$ ) and lowest in the push, fixed, process-based quality control cell ( $\bar{x} = 11.20$ ). However, good output was highest in both the pull, contingent, process-based and the push, contingent, output-based cells ( $\bar{x} = 14.60$ ,  $\bar{x} = 14.60$ , respectively), and lowest in the push, fixed, process-based quality control cell ( $\bar{x} = 9.20$ ).

Considering the marginals (Table 2), the fixed incentive condition had the lowest performance effectiveness ( $\bar{x} = 5.30$ ) and performance efficiency ( $\bar{x} = 0.72$ ) while the contingent incentive condition had the highest performance effectiveness ( $\bar{x} = 2.50$ ) and performance efficiency ( $\bar{x} = 0.91$ ). Output-based quality control had the highest total output ( $\bar{x} = 15.30$ ) while process-based quality control had the lowest total output ( $\bar{x} = 13.30$ ). For good output, fixed incentives had the lowest mean ( $\bar{x} = 10.70$ ) while contingent incentives accounted for the highest mean ( $\bar{x} = 13.50$ ).

#### Tests of hypotheses

Performance efficiency data were arcsin-transformed due to a significant skew. An arcsin transformation is a common method for inducing normality to data that have a ceiling limit. For example, the upper bound on performance efficiency is 1.00. Table 3 presents the *F*-statistics for each analysis of variance (ANOVA).

**Hypothesis 1.** Performance efficiency was significantly affected by the quality control system ( $F = 5.58$ ,  $p < 0.01$ ). Performance efficiency was higher in the process-based quality control condition compared to output-based quality control (See Table 2). Thus, there is support for the hypothesis that process-based quality control increases performance efficiency.

**Hypothesis 2.** The interaction between the production control and quality control systems on performance effectiveness was significant ( $F = 4.29$ ,  $p < 0.05$ ). Based on the marginal means in Table 1, pull production control was more effective when combined with process-based quality control ( $\bar{x} = 3.50$ ) than when coupled with output-based quality control ( $\bar{x} = 5.00$ ). In contrast, push production control was associated with higher effectiveness when combined with output-based quality control ( $\bar{x} = 2.30$ ) than with process-based quality control ( $\bar{x} = 4.80$ ). Thus, there was a significant interaction between the two control systems, with the predicted form.

**Hypothesis 3.** There was also a significant interaction of quality control and production/inventory control on performance efficiency ( $F = 3.83$ ,  $p < 0.05$ ). There was no difference in the marginal means on performance efficiency for the push production system, across the type of quality control system (both marginal means equalled 0.86). However, in the pull condition, the type of quality control did make a difference on performance efficiency: with output-based quality control the marginal mean was lower ( $\bar{x}$

TABLE 3. Analyses of variance: *F*-values

| Independent variables   | Dependent measures     |                           |
|-------------------------|------------------------|---------------------------|
|                         | Performance efficiency | Performance effectiveness |
| Production control (PC) | 1.59                   | 0.30                      |
| Quality control (QC)    | 5.58†                  | 0.46                      |
| Incentives (I)          | 35.81†                 | 12.14†                    |
| PC × I                  | 1.03                   | 0.29                      |
| PC × QC                 | 3.83*                  | 4.29*                     |
| QC × I                  | 5.29*                  | 1.60                      |
| PC × I × QC             | 0.32                   | 0.26                      |

\*  $p < 0.05$ ; †  $p \leq 0.01$ .

= 0.71) than with the process-based quality control ( $\bar{x} = 0.84$ ). Thus, as predicted, more benefit from pull was obtained when it was paired with process-based quality control.

*Hypothesis 4.* Performance effectiveness was higher with the contingent rather than with the fixed incentive system ( $F = 12.14, p < 0.01$ , see Table 2). The groups with contingent incentives, on average, missed the goal by 2.50 units compared to 5.30 units for the groups with fixed incentives, providing strong support for this hypothesis.

*Hypothesis 5.* Production efficiency was also significantly higher with contingent compared to fixed incentives ( $F = 35.81, p < 0.01$ , see Table 2). These results support the hypothesis.

*Other results.* Another significant, but non-hypothesized, interaction was found between quality control and incentives on performance efficiency ( $F = 5.29, p < 0.01$ ). Marginal means derived from information in Table 1 show that process-based quality control had a more positive effect on performance efficiency when contingent incentives were used ( $\bar{x} = 0.98$ ) compared to fixed incentives ( $\bar{x} = 0.72$ ). Output-based quality control was not affected as much by variation in incentives: with fixed incentives, mean efficiency was 0.73 and with contingent incentives, the mean for efficiency was 0.84. Thus, in both quality control conditions, efficiency was higher with performance-contingent rewards, a result that follows from the analytical and empirical research on performance effects of incentives.

## DISCUSSION AND CONCLUSION

The results are as predicted for all five hypotheses. The results show that variations in the quality control system ( $H_1$ ) and incentives ( $H_5$ ) had separate and significant effects on performance efficiency, and incentives had a significant independent effect on performance effectiveness ( $H_4$ ). We did find that there was a significant interaction of the production/inventory control system and the quality control system on performance efficiency ( $H_2$ ) and effectiveness ( $H_3$ ),

as expected. We found that the pull production control system was more effective and efficient when combined with process rather than output quality control. In contrast, push control was more effective and efficient when coupled with output rather than process-based quality control. Thus, we were able to provide experimental evidence that performance was an interactive function of the quality control and production/inventory control systems.

Three important findings emerge from this experimental research. First, even with a relatively low cost experiment, we were able to detect significant independent and interactive effects of the components of a manufacturing control system on performance effectiveness and efficiency. We believe that this implies that in more expensive, high fidelity (field or laboratory) experiments, even stronger effects may be present and detectable. Second, while we do not want to downplay the effects that social or cultural variables have on manufacturing performance, we have provided evidence that variation in manufacturing controls *alone* affects manufacturing performance effectiveness and efficiency. Third, our results provide evidence that laboratory experimentation can be an effective and efficient (initial) way to conduct research on manufacturing controls and performance. With careful design and subject selection, it may be possible to include culture in future experiments.

We view this experiment as exploratory in researching both the effects of manufacturing controls on performance, and generally broadening the scope of control system research. While we attempted to design the experiment to capture those elements of the production environments that we were modeling, it is clear that some improvements can be made. Below we offer four experimental and methodological considerations that may improve future empirical research.

First, considering the production control system, a test of the ideal pull system would have a WIP of zero. Future research could vary the level of WIP to test under what levels of inventory there are performance effects due to manufacturing control systems.

Second, the worker quality control manipulation can be made more explicit. While subjects who were responsible for quality control were observed by the experimenters to comply with the rule to stop and to correct defectives, it is possible that some workers did not, probably due to pressure to reach the performance target. Further, the experiment as conducted did not include a quality control inspection for the output-based quality control inspection for the output-based quality control condition. This feature could be included in a future study.

Third, both the production control and the quality control manipulations are very subtle compared to the incentive manipulation. Thus, the length of the experimental work period could be significantly extended, since it was

quite possible that we did not allow enough time for their subtleness to manifest. Fourth, to increase external validity, experiments could be done in which there are multiple performance periods including feedback and uncertainty.

In conclusion, we have been able to demonstrate that variation in manufacturing controls affects manufacturing performance. Our results imply that firms could improve manufacturing performance by matching production/inventory control systems and control systems, along with the use of performance-contingent incentive controls. Interestingly, many manufacturing firms seem to be attending to making these controls more congruent with their changing manufacturing environments (Schonberger, 1986).

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## BIBLIOSCENE

## POSITIVE ACCOUNTING RESEARCH: AN INTRODUCTION TO TWO REVIEWS

The publication of certain books marks the formal statement and elaboration of a research programme. When this is the case there is something incongruous about a journal responding with a single review. On pragmatic grounds such an option can be defended. On intellectual grounds this is less easy. Research programmes are open to a wide variety of forms of evaluation and assessment, and it is difficult to envisage a book review which would cover all their possible forms. This is not just a matter of constraints on review length, but arises from the specialisms of different reviewers, the different forms of evaluation they apply and the different levels at which they approach a particular text.

*Positive Accounting* is a complex book which operates at a number of different levels. It is novel in deploying a particular theoretical model within accounting. It seeks to illustrate the empirical viability of this model. It offers substantive propositions about the interested nature of accounting knowledge. And it advocates a particular set of general methodological rules for the study of accounting phenomena. It is this diversity of levels which makes a single review appear particularly

inappropriate. And it is this diversity which the two reviews published here address. Both authors are uniquely qualified in their respective lines of questioning. They differ in the questions they address to the research programme outlined in *Positive Accounting*. In no way do we wish to claim that these two reviews are exhaustive of the ways in which *Positive Accounting* could be approached. Rather, they are illustrative of the many possible forms of evaluation and assessment that could be undertaken.

Publishing two reviews side by side in this way is part of an attempt to further encourage the broadening of the terrain of accounting research. It suggests a principle of proliferation and a plurality of criteria as ways to achieve this, rather than a narrowing down. This seems a fruitful way forward for accounting research. It offers the possibility of a careful sifting of the different elements of research programmes and an evaluation of these from a range of perspectives. Hopefully this will contribute to the development of accounting research's empirical, theoretical and methodological dimensions.

## POSITIVE ACCOUNTING THEORY: A REVIEW\*

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### Abstract

Watts and Zimmerman's *Positive Accounting Theory* provides a refreshing, controversial and important contribution to accounting thought. It is important because of its vigorous emphasis on the entity's actual choice of financial accounting technique (or, more broadly, financial reporting activity). It is controversial because the theory and empirical techniques it conveys are not fully developed. It is refreshing because it challenges us to expand our thinking about the nature of accounting institutions.

In this essay, I try to document these claims about the content and significance of *Positive Accounting Theory*. The first section presents my interpretation of the work. The next section lists some concerns which I feel are important in consuming the work and in providing directions for continued labor. The third section discusses some unusual strengths in the work, while the final one provides some speculation about where accounting thought might next venture.

Before proceeding, though, a *caveat emptor* warning must be issued. This essay presents both aspects which I learned about and also those which I worried about while consuming *Positive Accounting Theory*. It is an experiential report.

### AN INTERPRETATION

The central theme in *Positive Accounting Theory* is choice of accounting method. Empirically, the work focuses on financial accounting method as a dependent variable. Theoretically, the work stresses the identification of the circumstances which produce a particular choice of financial accounting method. To illustrate, we want to predict choice of inventory method through time in the empirical domain; and we seek theory to guide this empirical quest. More broadly, we worry about the entire domain of financial reporting activities, ranging from choice of method through time, to audit arrangements, to political activities.

This amounts to a revealed preference approach. The basic data consist of entity choice and circumstance. From these data we hope to infer the forces, economic in this particular paradigm, that produced the observed choices.

In turn, theory is used both to guide us in the search for independent variables and to focus the inference task so that it can be accomplished or rationalized with an appropriate cost–benefit calculus.

This line of enquiry has a long tradition in economics. Consider a simplistic setting where an individual selects quantities of three goods subject to a budget constraint. The price vector is denoted  $p = (p_1, p_2, p_3)$  and the quantity vector  $q = (q_1, q_2, q_3)$ . Consumption of vector  $q$ , therefore requires expenditure of  $p \cdot q = p_1q_1 + p_2q_2 + p_3q_3$ . The empirical domain of neoclassical economics consists of prices and quantities. The revealed preference question is when can an external observer note  $p$  and  $q$  and make inferences about the individual's preferences? The economist, of course, typically exploits rational behavior; rational in the sense that it is sufficiently consistent to be represented by a utility measure. This focuses the observation question

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even further, to the point of asking when price and quantity observations can be used to construct the individual's utility function.<sup>1</sup>

For our purposes, there are three aspects of this exercise to keep in mind. First, the observables are prices and quantities. The direct analogy to accounting would have us observe accounting method prices and the accounting methods actually chosen by the entity. Second, the inference exercise is subject to a regularity condition that the observed prices and quantities be sufficiently consistent that they can be represented by some utility function. The direct analogy to accounting would have a consistency condition that the observations be consistent with some cost-benefit calculus. Finally, the individual's tastes are taken as a primitive. The direct analogy to accounting would have us regard the entity's tastes for accounting method as a primitive in the observation and inference process.

The analogy is strained because observation and choice in the accounting domain are not clear-cut, and this sheds light on the delicacy of revealed preference experimentation in accounting. We observe, more or less, the entity's choice of financial reporting method, along with the contemporaneous specification of GAAP. Prices are another matter. Likewise, there is a sense in which the entity's tastes are not primitive.<sup>2</sup> More broadly, we view the firm as selecting an "optimal" mix of inputs and outputs, including contracting arrangements. Accounting is but one factor of production in this larger problem. The entity's tastes for accounting, then, depend on the prices of other factors. Thus, the notion of preference for accounting method is a motion of induced preference. To illustrate, let us return to the simple setting with three commodities. We speak of preference for the first two, by associating with each pair of  $q_1$  and  $q_2$  the conditionally best  $q_3$  (depending on

wealth and prices). The induced preference for the first two, in other words, depends on market circumstances and taste for all three. In this way, we recognize that focus on an entity's choice from GAAP is an induced preference exercise where we match each reporting method with its conditionally best mix of other factors. Cross-sectionally, then, we would like to control for this movement to induced preference by acknowledging the mix of other factors in the experiment. Similarly, in a time series experiment we would like to acknowledge the time series nature of GAAP, as well as of the entity's production function and conditionally "optimal" mix of other factors.

It is also useful to notice that the revealed preference theme has, in various forms, a long history in the accounting literature. This theme, for example, is apparent in the human information processing literature (e.g. Libby, 1981, in particular, or Kahneman *et al.*, 1982, more generally). Broadly construed, we offer the subject some information processing opportunities and ask him or her to respond with a "choice" of processing. As the data base of choices builds, we begin to see patterns. Examples are conservative information processing or anchoring (relative to Bayesian processing). The basic data, in other words, are the subjects' actual choices. Contrary to the economist's rationality focus, however, rationality (as defined by Bayesian revision and a consistent approach to risk aversion) is not documented or inferred. Rather, the focus is on documentation of systematic tendencies relative to this norm.

The revealed preference theme is also apparent in field studies (e.g. Hopwood, 1972; Brownell, 1986; Banker & Datar, 1987) where we study budget mechanisms in their natural environment. Here we envision a broad set of budget devices, including such things as how to mea-

<sup>1</sup>The standard consistency condition is the strong axiom of revealed preference. Casually, this states that if commodity bundle  $q^0 = (q_1, q_2, q_3)$  is revealed preferred to bundle  $q^1$  ..., is revealed preferred to bundle  $q^2$ , then  $q^0$  must also be revealed preferred to  $q^2$ . See Henderson & Quandt (1971), Varian (1971) and Chipman *et al.* (1971).

<sup>2</sup>In particular, I speak of the "entity's choice" or the "organization's goals" in this essay. But a deeper understanding would allow us to treat the entity's tastes as endogenous. Recognize, therefore, that when I speak of the entity's choice I am sidestepping basic questions of how this entity forms and operates.

sure performance, what non-financial information to use and evaluation "style". Links to the entity's environment and mix of productive factors are sought in turn, so as to make some inference about the taste for (or appropriateness of) the procedures and infrastructure that are observed.

In my view, then, *Positive Accounting Theory* is an exercise in revealed preference. We have some experience with this art form, especially in the human information processing and intra-organization reporting settings. The novelty of *Positive Accounting Theory* is its emphasis on economic constructs in the financial reporting domain. Studies of this genre include Hepworth (1953), Archibald (1967) and Gagnon (1967). Recent work takes advantage of developments in economic theory, and empirical techniques and opportunities. *Positive Accounting Theory* stands out for its coherence and broad application, for its attempt to structure financial accounting debate within a single framework of efficient organizational arrangement.<sup>3</sup>

### SOME CONCERNS

This work has generated concern in response to the identification of its precise nature (e.g. Christenson, 1983) or the execution of particular studies (e.g. McKee *et al.*, 1984; Holmstrom, 1982). Maintaining the view that the work is an exercise in revealed preference focuses my task of placing the work in perspective. On the one hand, the application of revealed preference to the financial accounting domain is novel, and we should therefore expect a refinement in theory and empirical application as the art form progresses. On the other hand, the work has an extensive pedigree, and we should therefore expect to exploit this pedigree in developing the art form. Some insights along this line flow from the in-

duced preference nature of the application. Others flow from surrounding applications.

Stepping back from the specific studies, though, I identify several common themes which I think are useful to keep in mind when working through this material. My first such concern is the rhetoric of perfect markets. Market value maximization, present value and wealth are useful constructs from the world of perfect and complete markets. Accounting is most (or perhaps only) interesting when markets are not pristine. Contracting and political costs emerge in *Positive Accounting Theory* as an important acknowledgement that markets are not perfect. What, then, would the organization's goal become? Is market value maximization sufficiently descriptive? Is present value sufficiently well defined in a world of significant market imperfections? What is wealth in a world where professional managers face significant and largely uninsurable career risks? Limited marketability and non-financial concerns enter here, and we are led to search for a mechanism to rationalize the entity's goals. Unfortunately, we have little theory to guide us. *Positive Accounting Theory* cannot be faulted for this shortage of theory; but it is important to keep in mind that the rhetoric of perfect markets is a substitute for inadequate theory.<sup>4</sup>

My second concern is covered by the question: what is endogenous here? Revealed preference has its roots in individual choice and, aside from complaints that advertising creates (a lack of) taste, the primitive in the system is the individual's taste. Here, however, we are worried about a major corporation's choice of public reporting method at a particular time in its history. Is it sufficient to focus the exploration of something like bonus plan characteristics or the structure of debt contracts? More generally, these contractual relationships are endogenous.<sup>5</sup> What characteristics of the production function,

<sup>3</sup>Broad structures are in abundance in the literature, e.g. Canning (1929). Also, it seems more correct to view *Positive Accounting Theory* as offering a broad structure of accounting, not simply financial accounting. But the book is confined to financial reporting experiments and I therefore carry along the financial qualifier.

<sup>4</sup>Recall my caveat in note 2.

<sup>5</sup>Leftwich *et al.* (1981), for example, provide a model based on exogenous supply and demand for monitoring, where demand is driven by size, debt, preferred stock and price.

along with the labor, capital and product markets, conspire to lead the organization to these choices? Formal agency theory (e.g. Hart & Holmstrom, 1987) concerns itself with the link from environment to contractual relationships, and therefore to induced organization choices.

More specifically, the entity's choice of reporting method is one among countless factor choices. Most of these choices are decentralized, and the managers and the control systems under which they labor are endogenous. Linking accounting choice to particular contractual arrangements (such as a debt covenant or a formal bonus plan) is interesting, but we want a more primitive identification. What environmental factors are associated with the combined arrangement of contracting, and accounting choice?<sup>6</sup> An economically designed organization orchestrates the behavior of its actors. The more important question, then, is not how accounting method choices vary through time and circumstance, but why the organization has been designed to motivate this particular behavior in the accounting domain. Returning to the three commodity vignette, it is as if the third commodity had disappeared from the analysis. This casts, it seems, considerable noise (if not bias) into the empirical exploration. There is a tendency here to treat the endogenous as exogenous.

A third, and closely related, concern deals with the level of integration among the various components of the labor, capital, product, information and political "markets". In building a model or seeking an empirical identification we always employ judgment in defining the boundary of the exercise. But it strikes me that considerable care is required in understanding where the boundaries appear to be drawn in *Positive Accounting Theory*. One illustration of where this boundary concern appears is in the focus on accounting earnings. Competing sources of information are always present. In studying accounting, then, we want to recognize the existence of this other information. This drives us to

worry about conditional instead of marginal probabilities in defining information content. It also drives us to worry about the comparative advantage of accounting. Thus, it would seem that the information content of actual techniques given that we already know the information conveyed by the cash outcome would be a useful way to structure the debate. Similarly, searching for correlation between the "performance index (earnings) ... [and] the effect of the manager's actions on the value of the firm" (p. 206) misses the importance of other information. The correlation should be a partial correlation, recognizing the existence of the other information (e.g. cash). In each instance we want to ask what we are learning, given what we have already learned from other sources. Drawing the boundary a little less tightly would carry along the idea that we must be ever cognizant of the other sources of information.

Another illustration of this boundary concern arises in the political sector of the argument. Political activities are important in understanding regulatory phenomena. Formal economic modeling of multiperson phenomena uses the notion of equilibrium behavior. Here, by contrast, we see extensive use of behavioral constructs instead of formal equilibrium analysis. For example, a common theme is that politically sensitive firms seek to minimize short-run reported income (though apparently not in the obvious fashion of designing and producing unsalable products). Yet this activity is successful in the political arena because of "information costs". This strikes me as an unusual equilibrium, but I have no formal model to offer or cite.<sup>7</sup>

Another example is the use of political costs (which are then measured by size) in the argument. A good analogy here is the stockout cost in a conventional inventory model. We posit particular ordering and holding costs, and then round out the model with some generic cost number to link the analysis to the back ordering, rescheduling and demand shift activities that are

<sup>6</sup>In contrast, the intra-organization studies tend to focus on environmental explanations, but without use of (induced) economic incentives as an intervening variable.

<sup>7</sup>A parallel comment applies to the notion that lobbying activity is useful in the political arena, or "market".

likely to accompany a stockout. I liken this to asking for a cost number to surrogate for that part of the analysis too difficult to formalize (and this is likely to be part and parcel of an efficient decision analysis technique). When reading *Positive Accounting Theory* we want to acknowledge the importance of political activity in the revealed preference analysis. But we do this by envisioning a political cost term without examining (equilibrium?) behavior in a larger model. Once this is recognized, we begin to understand that political cost is an equilibrium notion that is vital to integrating the argument. At this point we have a label for this important link; but its theoretical and empirical nature remain a mystery. *Positive Accounting Theory* is candid about the under-development of the political cost notion. My suggestion is that it is usefully thought of as an equilibrium notion, linked to where we circumscribe the argument. [Moreover, the equilibrium behavior we are trying to intuit may be counter intuitive. For example, in equilibrium a tightening up of GAAP to more informative disclosure mechanisms may reduce the amount of disclosure, as in Dye (1985).]<sup>8</sup>

A final concern is one of empirical aggressiveness. To argue by analogy, we do not see industrial organization economists examining the settings on screw machines in their empirical work; they tend to be more macro, concerning themselves with such things as cost curve estimation or documenting aggregate regulatory effects. The question is, at what point do we outstrip the empirical technology in this domain? (I have no answer.) One example is a focus on switching phenomena. With a larger model of the accounting method choice problem, it seems that the switchers at any particular point would be those who are closer to the margin. Does this suggest unusual empirical noise in the quasi experiment? Another example stems from regulatory activities. A regulatory announcement does

more than change the list of regulations. It conveys that now was an opportune time to change the list of regulations, and thus may convey something about future regulatory manoeuvres. Preservation of the current list of regulations has a similar interpretation: What control variables can we access to acknowledge that how the game is played may be a source of information to the game's participants?

Another example is the importance of other sources of information. Again using the three commodity vignette, choice of  $q_2$  and  $q_3$  will generally depend on the prices of all three commodities. Ignoring other sources of information (as well as substitutes for lack of information) amounts to ignoring the first price in this illustration. At present we have limited insight into the importance of this myopia. Presumably, field studies, with an emphasis on documenting the actual reporting choices along with an enormous amount of detail about other sources of information and the local environment, can be focused on this question.<sup>9</sup>

#### SOME UNUSUAL STRENGTHS

Two features of *Positive Accounting Theory* are, in my mind, sufficiently important to warrant emulation. The first is sheer novelty. Revealed preference work has been a familiar activity in some areas of our literature. Moving it into the financial reporting sphere in a vigorous fashion is a major improvement in our literature. In fact, it forces me to think in more expansive ways about accounting, and to be more judicious in attempting to link the various strands of our literature.

The second important feature is risk taking behavior. Novelty is not in abundance in our literature, perhaps because producing novel lines of thought is a risky business. The work in *Positive*

<sup>8</sup>Notice how far we have moved from the single person specification of the usual revealed preference experiment. Strategic behavior is now a possibility, thus raising additional concern over how widely the experimental net should be cast.

<sup>9</sup>Yet another example concerns the choice among indifferent alternatives. From a preference perspective, we regard the exercise as well structured up to the identification of equivalence classes. Yet the array of informationally equivalent accounting choices, especially when other sources of information are present, may be large. See Antle & Demski (1988).

*Accounting Theory* resulted from a willingness to take research risks. The bet was an under developed theory coupled with under-developed empirical techniques could be combined to teach us something. On the surface, it is not apparent that this is a wise bet (though it has surely been revealed to be so). Even at this juncture, we are not yet assured that this particular line of activity will continue to occupy a major portion of the literature. That depends on the success of the next generation of studies. However, at this time in our literature, it is clear that *Positive Accounting Theory* has catalyzed considerable thought. Risk taking behavior produced this catalyst. Where are the new risk takers?<sup>10</sup>

### SOME SPECULATION

Assuming that *Positive Accounting Theory* is the state-of-the-art in revealed preference work at this level, what might we speculate to be the next direction that this line of thought will take? Williamson's (1985) notion of governance strikes me as a likely candidate. The most haunting thought that occurs when studying this literature is how little it tells us about accounting. We have an unusual mixture of mandated, delegated and regulated reporting — all in an environment of political oversight and occasional political onslaught. Why do we allow managers freedom, of a sort, to select a reporting method? Why do we entrust dynamic adjustment of GAAP to the FASB along with dynamic adjustment of GAAS to the AICPA? (Why do we have separate entities for governmental reporting, not to men-

tion railroads?) What explains the governance structure before us? What is it about financial reporting that creates a demand for such an elaborate governance structure? Demand for governance, it seems to me, is needed to round out the theory and empirical work. We have an unusual institutional structure in accounting, complete with an unusual governance structure. Accounting research will, one hopes, address this landscape.

### CONCLUSIONS

The test applied to *Positive Accounting Theory* in this essay is utilitarian: given the state of our literature, does this addition contribute to our stock of knowledge? To me, the answer is affirmative. *Positive Accounting Theory* offers novelty and vigor. Many questions remain because the theory is scant and because the empirical techniques are at the early stages of development. The short-run success of this research activity is assured by the questions posed. The long-run success is linked to progress in dealing with these questions.

Refinements in theory and empirical technique can be anticipated on this score, as can gradual expansion to include the issue of governance. Scholarship, though, is an interactive process. Revealed preference is a well-practiced art form in other settings, and it seems that *Positive Accounting Theory* has something to learn from these complementary enterprises, just as they have something to learn from *Positive Accounting Theory*.

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<sup>10</sup>This may tell us something about the infrastructure of our scholarly enterprise.



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## THE POSSIBILITY AND UTILITY OF POSITIVE ACCOUNTING THEORY

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### Abstract

Watts & Zimmerman's *Positive Accounting Theory* (Englewood Cliffs, NJ: Prentice-Hall, 1986) celebrates the growth of "scientific" accounting research in the U.S.A. and the intellectual progress it has made. The extent to which this sort of research does follow the precepts of empiricist philosophies of science, however, is a matter of some debate. Moreover, the coherence and applicability of the methodological rules Watts & Zimmerman claim to follow is questionable. In particular, the Popperian research programme is of doubtful utility for accounting researchers. Particular characteristics of social phenomena also raise doubts about the feasibility of engineering models for theory-based social technologies. These doubts about the epistemological and practical value of "positive accounting theory" lead to an alternative, sociological, explanation of its growth and institutionalisation in academic accounting research.

The publication of *Positive Accounting Theory* by Watts & Zimmerman (1986) provides an opportunity to reflect on the considerable growth in academic research about accounting practices, especially in Anglo-Saxon cultures, and its dominant style. As many authors have observed, accounting research has become a central activity for many business school academics and has substantially changed direction towards a more formal and deductive concern with hypothesis testing and quantitative methods (Dyckman & Zeff, 1984; Hopwood & Bromwich, 1984; Kaplan, 1986; Mattessich, 1972). It is the new style of research which is celebrated by Watts & Zimmerman as being "scientific" and which they see as meeting an increased demand for knowledge. In many ways, this book can be seen as a manifesto for such "scientific" accounting research and for their leadership position in its takeover of academic accounting in the U.S.A. Despite Christenson's (1983) demolition of the scientific pretensions of the "Rochester" school of accounting research, and others' attacks on their account of the growth of academic research (Lowe *et al.*, 1983; cf. Peasnell & Williams, 1986), Watts & Zimmerman continue to

presume the scientific status of the new style of accounting research and its practical utility without systematic justification.

In considering this expansion of academic research and its domination by a particular style and belief system in this essay, I shall concentrate on the adequacy of the dominant model of "science" assumed by many accounting researchers as a theory of scientific method and its appropriateness for accounting research. After briefly discussing Watts & Zimmerman's view of positive accounting theory and the extent to which it follows the methodological rules which they claim are constitutive of scientific knowledge, I consider some of the difficulties associated with the Popperian research programme in the philosophy of science. I focus on Popper's theory of scientific method because both Watts & Zimmerman and some of their critics, such as Christenson, claim to follow it. Next I consider whether methodological rules for evaluating knowledge claims in the natural sciences can be generalised to the social sciences, as Watts & Zimmerman and many others assume, and the consequences of certain features of social processes and phenomena for the production and

evaluation of knowledge in the sciences. These features also affect the use of accounting theories for improving accounting practices and conventions. Finally, I shall briefly suggest some of the sociological reasons why accounting research has grown so much and become dominated by formal quantitative methods and approaches.

#### THE NATURE AND STATUS OF POSITIVE ACCOUNTING THEORY

According to Watts & Zimmerman (1986, p.2), positive accounting theory is concerned with the explanation and prediction of accounting practices. It provides reasons for observed practices and predicts the occurrence of unobserved accounting phenomena. It is "positive" because it deals with "facts" about how the world works as opposed to normative statements and theories which are concerned with prescriptions about how the world should work. Claiming the authority of Milton Friedman and other economists for this distinction, the authors appear oblivious to the considerable critical literature about "positive" economics (see, for example, Caldwell, 1982, Chapters 8,9; Coddington, 1972; Eichner, 1983; Musgrave, 1981) and the limitations of empiricist philosophies of science. They also appear ignorant of recent discussions about the appropriateness of natural scientific methodologies for the human sciences and of engineering models for social intervention technologies (Bhaskar, 1979, Chapters 2,3; Fay, 1975, Chapters 2,3; Stockman, 1983, Chapters 6,7; Thomas, 1979, Chapters 3,4; Turner, 1980). The idea that accounting researchers can simply construct general theories of accounting practices which will enable practitioners to predict the outcomes of their decisions in an uncertain world by following methodological rules based on neo-classical equilibrium economics is, to say the least, tendentious and open to considerable scepticism. The ability of Watts & Zimmerman to ignore much of the literature in the philosophy of the natural and social sciences while making

methodological assertions exemplifies the fragmented nature of accounting research as an intellectual field and the lack of strong theoretical norms integrating research results (Whitley, 1984).

Watts & Zimmerman consider recent accounting research to be largely constituted by empirical "tests" of economics-based theories about the role of accounting information in market changes. Although they do refer to some other work, the bulk of their discussion of positive accounting theory focuses on the extension of equilibrium theories to capital markets and the disequilibrating effects of new accounting information. Thus there are chapters summarising research on the Efficient Markets Hypothesis and the Capital Asset Pricing Model, the effects of earnings announcements, disclosure regulations and changes in accounting conventions on share price movements, on agency contracting and on the managerial selection of conventions. Practically all this research presumes the adequacy of neo-classical economics models of markets and "tests" hypotheses by statistical analyses of standard data bases derived from annual reports and similar public information. It thus purports to follow the model of scientific work popularised by logical positivist and logical empiricist philosophers of science in which scientists develop theories and general laws which are then tested against observation statements based on experience. According to Watts & Zimmerman, this sort of research has demonstrated progress because theories have been replaced by more refined ones and technical errors have been corrected. Thus they summarise the development of empirical accounting research as a series of theoretical improvements and technical refinements.

Leaving aside the question as to whether this selection of research is fully representative of recent accounting research, and whether "positive" research is the only type worth summarising, it seems doubtful whether these studies do indeed follow the methodological rules promulgated by philosophers such as Hempel and Popper. Christenson (1983) has already pointed to the failure of the "Rochester School" to test their

theories systematically and the *ad hoc* adjustments made by Watts & Zimmerman when faced with apparent falsifications of their hypotheses. Similarly Lowe *et al.* (1983) produced empirical evidence which appeared to contradict their account of the development of accounting theories in their 1979 paper, yet the bulk of that paper is reproduced as an explanation of the growth of accounting research in this book. This cavalier approach to empirical tests is echoed by their rather simple account of intellectual change and development which assumes that scientific progress consists of methodological improvements to account for "anomalies". Whereas Popper (1968, pp. 81–111) suggested that scientists should reject theories which were found to be inconsistent with observation statements, and progress consisted of replacing falsified theories by those with greater empirical content and verisimilitude, Watts & Zimmerman seem to applaud the continued acceptance of the EMH and the CAPM despite their immunity to empirical tests (Findlay & Williams, 1980) and are also unable to demonstrate that the empirical content of accounting theories has increased. Indeed it is not clear how any theory which claims to describe equilibrium states of "perfect" markets in which information is costless and true could be considered to have empirical content (cf. Whitley, 1986). Since, however, similar points have been made about economics, this sort of accounting research may be no worse than other pseudo sciences (Blaug, 1980, pp. 253–264; Caldwell, 1982; Deane, 1983; Hutchison, 1976, 1984).

If the research summarised by Watts & Zimmerman does not follow the methodological precepts which they claim characterise "science", then the epistemological status of its knowledge claims is clearly in doubt. A further possibility, of course, is that Popper's methodological rules are incoherent and/or inappropriate to knowledge about these sorts of phenomena. In particular, they may not be applicable to research in the human sciences (Findlay & Williams, 1985). This latter possibility is not mentioned by Watts & Zimmerman because they consider the scientific method of

hypothetico-deductivism to be applicable to all phenomena and to be the only valid way of generating and assessing truth claims in all the sciences. The overall adequacy of Popper's account of scientific progress is likewise not considered by them, they offer no reasons for preferring it to, say, realist accounts (Bhaskar, 1975; Harré, 1970) or show any indication that they are aware of alternatives. In fact, the only justification for claiming the authority of Popperian epistemology seems to be its use by Blaug (1980) in his analysis of economics.

Generally, Watts & Zimmerman appear to rely a great deal on the dominant orthodoxy of neo-classical economics in justifying positive accounting theory and their book could be seen as presenting a methodological case for reducing accounting research to a branch of economics. Depending on one's view about the epistemological status of orthodox economics and its validity as an intellectual enterprise, this foundation for accounting research may seem less than secure, especially if researchers are concerned to explain why social events and phenomena occur and change and help to resolve practical problems. As Findlay & Williams (1980, 1985) point out, drawing policy recommendations for financial analysts and managers in an uncertain and internally related world from theories that reduce uncertainty to risk is unlikely to be very effective. Similarly, presumptions of "perfect" competition, homogenous expectations, costless information and negligible transaction costs render much financial economics and positive accounting theory remote from the world of practitioners and incommensurate with their concerns (Whitley, 1986). The dominance of such presumptions in economics does not, *pace* Jensen (1972) and Ross (1978) automatically justify their correctness or demonstrate their relevance for everyday problems in uncertain and interdependent social worlds.

The epistemological status of recent accounting research has been discussed by a number of writers in the past 5 or so years, (e.g. Ryan, 1982; Thomas, 1981; Tomkins & Groves, 1983). In many cases, a particular philosophical position

has been assumed and then used to evaluate a body of research without a great deal of attention being paid to the purpose and adequacy of that position. As we have seen, Watts & Zimmerman claim the authority of Popper for their view of science and its generalisability to accounting research, a commitment that is shared by some of their critics, such as Christenson (1983). In considering how appropriate such a commitment is for accounting researchers and those urging particular sets of methodological rules for them, it is clearly important to understand the purpose of such rules and the extent to which they fulfil it as well as its appropriateness for analysing the epistemological status of accounting research. Before, then, discussing the issue of whether theories of natural scientific knowledge are necessarily applicable to the human sciences, I shall briefly raise a number of issues about the nature of the Popperian research programme in the philosophy of science and its success in providing a theory of progress of scientific knowledge. Although I focus on Popper's work, many of the points raised are applicable to other forms of logical empiricism.

#### THE PURPOSE AND ADEQUACY OF THE POPPERIAN RESEARCH PROGRAMME

One of the most important characteristics of Popper's theory of scientific method is its attempt to formulate a set of methodological rules by which scientific knowledge could be said to progress. Essentially, Popper is concerned to develop a "rational" theory of scientific change which provides the rules of the game of science as a progressive intellectual enterprise (Popper, 1968, pp. 53, 119–126, 276–281; 1963, Chapter 10). This goal is different from the logical positivist attempt to formalise existing scientific knowledge as a true coherent system and thus establish the epistemological criteria for assessing knowledge claims on the basis of currently accepted physics. Popper dismissed such "scientific naturalism" because of the fallibility of scientific knowledge and especially of empirical observations (Popper, 1968, pp. 50–53). By

grounding the validity of empirical knowledge in irrefutable experience of the natural world, the positivists presumed that the current scientific elite had produced true knowledge which could not be revised or radically improved upon. Since Popper thought that the basic task of a theory of science was to account for progress through intellectual change, he rejected this static notion of knowledge based on the fallacious doctrine of induction. In his view, experience is always revisable and contestable and so cannot provide a firm and irrefutable epistemological basis for assessing knowledge claims, rather it is how experience is used that separates scientific knowledge from other forms of understanding. As he suggests (1968, p. 108): "the testing of a theory depends upon basic statements whose acceptance or rejection, in its turn, depends on our *decisions*. Thus it is *decisions* which settle the fate of theories".

This methodological conventionalism claims that it is the conventions governing how scientific judgments and choices are made that determines their validity and whether they will lead to progress. As a theory of scientific method, then, Popper's approach has to be judged in terms of its coherence in establishing decision rules that account for scientific advance and the likelihood that these rules will be institutionalised in research systems. Because this approach focuses on how decisions are made, or should be made if science is to progress, it has to demonstrate that its methodological rules could form the basis of the collective decision-making system we call science. Although, then, the Popperian programme is not invalidated by observations that scientific elites do not follow its rules (see, for example, Collins, 1975, 1981; Farley & Geison, 1980; Knorr *et al.*, 1981; Pinch, 1986; Wynne, 1976) because it does not attempt to describe how presently constituted science functions, it has to show that a scientific community could function in the prescribed manner if it is not to be dismissed as vacuous. By locating the source of epistemological validity in the collective conventions of scientific communities, Popper has to develop a sociology of possible scientific communities as a major part of an epis-

temologically adequate theory of scientific progress.

There are at least four major reasons for doubting the success of the Popperian programme in formulating rules which would lead to progress in the sense of improving the truth content of scientific theories. First, it fails to specify in detail how scientists are supposed to decide when to accept or reject basic observation statements where there is some doubt about experimental details, and/or the acceptability of particular observation theories. In such situations scientists could quite "rationally" disagree about the possible falsification of theories. To suggest that *ad hoc* adjustments be rejected is little assistance here since it is simply unclear which possible modifications increase or decrease empirical content. Thus adherence to falsificationist norms may be indistinguishable from conventionalist stratagems. Similarly, Popper assumes that the empirical content of a theory is, in principle, measurable and comparable across theories yet offers no suggestions as to how this is to be achieved and so no guidelines for demonstrating that intellectual progress has, in fact, occurred. Thus, as a theory of how science progresses it is incomplete.

Secondly, comparing and deciding between two competing theories involves the comparison of their associated observation theories, conditions of application, descriptive vocabulary, etc. (Feyerabend, 1968). There seems little reason to expect all of these to overlap to the extent required for a single crucial experiment to decide unambiguously between them. The more divergent are the terms through which theories are expressed and the domains over which they purport to be true, the less likely is it that they could be directly compared and assessed. Given the necessary connections between observation theories and general theories — i.e. they must share basic descriptive terms and be mutually consistent — it could be quite "rational" for the adherents of one theory to reject the evidence produced by those following a competing one. Clearly, theories which conceive phenomena in radically different ways cannot be evaluated in terms of a single set of basic statements (Lakatos,

1970).

Thirdly, it is not at all obvious why evolutionary competition should necessarily lead to cognitive progress, except in the trivial sense that survival defines superiority. For trial and error testing to be progressive in a Popperian sense the domains of competing theories would have to be directly comparable and stable over a sequence of tests. Equally, the meaning of each test and its conditions of validity would have to be clear and generally acceptable so that "progressive" conclusions would be drawn. Competition between theories, then, implies a common and stable domain of application if it is to be progressive. Otherwise, there is no reason to expect surviving theories to be "better" than other ones. Popper offers no grounds for presuming such commonality between rival theories, other than the view that if science is to progress then it must exist. As Feyerabend points out in a series of papers (1965, 1975, 1981), there is considerable historical evidence to suggest that other forms of intellectual progress have occurred when it did not exist.

These, and other, difficulties in the Popperian programme led Lakatos to develop his well known methodology of scientific research programmes (1970) which attempted to formulate a "rational" theory of scientific change while allowing for untestable assumptions and the rejection of conflicting evidence. Later (1971) he extended this approach to incorporate the history of science in an attempt to integrate epistemological theories with historical reconstructions. However, as Feyerabend (1970) pointed out, Lakatos is only able to claim the rationality of scientific progress through competition between research programmes in retrospect, and even then the verdicts of history may be revised through the revitalisation of rejected programmes. Thus rationality becomes contingent and contextual.

In addition to these internal problems there is the more sociological issue of whether it is likely, or even conceivable, that scientific communities could be organised around the common goal of the pursuit of corrigible truth through the systematic falsification of members'

intellectual creations by commonly agreed testing procedures and criteria for assessing the validity of basic statements. Not only do such social organisations seem extremely rare in the history of the modern western sciences but it is difficult to see how they could be established and reproduced.

A social institution which rewards the production of bold conjectures and radical theories, and their elaboration into detailed accounts of phenomena and events, encourages commitment to those theories rather than to their falsification and rejection. Such commitment is likely to lead to rejection of contradictory evidence and the system of beliefs that produced it. If, on the other hand, the social institution rewards criticism and demolition of theories, it is difficult to see why scientists should bother to develop them, let alone make them easy to falsify. Research takes time and resources, so that if it is not supported by the institutions governing reward allocation then it is unlikely to be extensively undertaken. Thus, a wholly critical intellectual system is likely to run out of conjectures to criticise and so progress is improbable. A social institution which tries to reward both sets of activities is likely to bifurcate into theory producers and theory destroyers who share few common assumptions and interests. Exactly how Popper's ideal combination of conjectures and refutations is to be achieved in a functioning social institution remains, then, obscure. This obscurity is not greatly reduced in his political arguments in favour of "open" societies. Since it is the collective institutionalisation of his methodological rules which generate progress, this obscurity means that his theory of scientific progress is incomplete.

#### METHODOLOGICAL RULES IN THE HUMAN SCIENCES AND THE ROLE OF ACCOUNTING RESEARCH IN CHANGING PRACTICES

These problems and difficulties of the Popperian programme in the philosophy of science render its direct application to the human sciences in the manner of Watts & Zimmerman

of doubtful value. Even if it was more successful in accounting for progress in the natural sciences, though, it is not obvious that such methodological rules necessarily apply to the human sciences. There are three major sets of reasons why the simple extension of methodological rules for the study of natural phenomena to the human sciences is questionable. First, the goals of the human sciences are not necessarily identical to the dominant purposes of the modern natural sciences, i.e. control over the natural world, and so methodological rules justified in terms of the latter may not be appropriate. Second, social research is a value-laden and interactive activity in ways which do not apply to the natural sciences. Third, social phenomena and events are constituted by meanings and cultural conventions and vary accordingly.

In respect of the first point, most philosophies of the natural sciences have assumed that their underlying purpose was to improve our ability to manipulate and control the natural world, rather than, for instance, to admire, and become integrated with, coherently ordered natural processes. In this respect they follow the dominant ideology of modern western science since the latter part of the 17th century and the triumph of the Baconian programme for the domination of nature (e.g. Daele, 1977; Merchant, 1980, pp. 172–190). As a result, most normative methodologies conceive of epistemological validity and progress in terms of prediction and control. While such motivations are undoubtedly present in the human sciences, indeed they probably account for the bulk of the funding of social research, they are not the only ones and do not monopolise all research traditions and assessment standards. In particular, there are well established conventions and norms governing historical research and literary studies which are not justified in terms of control goals and which have so far successfully resisted subservience to logical empiricist doctrines (Stockman, 1983, pp. 128–130). Even if the dominant interest in undertaking accounting research — and management research in general — is to generate knowledge which will help to solve practitioners' problems by enabling them to control social

processes better, the existence of alternative goals and methodological norms means that the presumption of the unity of methodological rules across all sciences is not warranted. In any case, the idea that social scientific knowledge can improve managers' ability to control the social world as if it were a closed social system, whose outputs can be systematically varied by altering inputs, is dubious as we shall see.

The issue of the value laden nature of social research has been the subject of extensive discussions, at least since Weber's essays about sociology (1949), and Schreuder has recently provided a useful summary of some of the main points involved with particular reference to theories of accounting (1984). As he suggests, both the natural and the social sciences, and methodological schools concerned with them, involve value judgements in the design of research projects, in the practical application of results and in the general commitment to research as an activity leading to knowledge. They differ, however, in the degree to which: (a) evaluative judgements are part of adequate descriptions of phenomena, and (b) scientific accounts necessarily involve critical assessments of the phenomena being studied.

Descriptions of social events and phenomena often require the use of terms which have positive or negative connotations, both in the scientists' own culture and in the one being analysed. Democracy, extermination camps and efficiency are all terms which may be used to provide accurate descriptions of states of affairs and which have evaluative meanings. Their correct use thus necessarily implies value judgments about the state of affairs being described in a way that does not occur in many natural sciences — although it may in the biological sciences. In and of itself, this need not imply that the social sciences are fundamentally different from physics and chemistry since rules for evaluating descriptive terms and sentences can be developed in a similar manner to those in the latter fields without necessarily adhering to the value judgments implicit in them. Thus, there are conventions governing the correct description of a political system as a democracy and of a prison camp as an

extermination camp (Bhaskar, 1979, pp. 74–77), which are distinguishable from the value commitments implied by those terms. However, this evaluative component of descriptive terms does restrict their domain of appropriate application and thus the generality of law-like statements including them. To apply terms such as democracy, justice and freedom to the analysis of societies which have no conception of what they mean or how they could be valued, is clearly to produce inadequate descriptions. Methodological rules which insist on the formulation of universal statements, then, are inapplicable to the human sciences.

The construction of social scientific explanations of events and phenomena implies that everyday explanations and descriptions are, in some way, flawed and inadequate. Thus, to seek to explain why certain firms use particular accounting conventions in presenting their financial results by the self-interest of their top managers, as do many researchers discussed by Watts & Zimmerman, is to criticise those managers' own accounts of their choices, i.e. as being in need of further explanation. Such explanations, which necessarily involve redescriptions of participants' accounts, also suggest why managers held the incorrect beliefs they claim to have. Since these beliefs and accounts constitute the social reality being explained then social scientists are inevitably criticising what exists, simply by taking them as problematic. Thus, the assertion of epistemological superiority by researchers implies a negative evaluation of everyday meanings. Except perhaps in the use of certain metaphors, this sort of evaluation of the phenomena being studied does not occur in the natural sciences, at least not to the same extent (Merchant, 1980, pp. 192–252), and so theories of scientific method which prohibit it are not applicable to the human sciences.

These differences between the human and the natural sciences are connected to the third set of reasons for questioning the direct applicability of methodological rules for the study of the natural world to the social world: the meaningful nature of social phenomena. The objects being explained in the social sciences are partly consti-



tuted by the meanings used to characterise them by people, and by the norms governing correct usages in particular cultures. Thus the same physiological movement, e.g. shaking hands, can have quite different meanings in different cultures and so constitute different social phenomena. Financial accounts may consist of black marks upon paper but their meanings vary according to the conventions governing their use and so the nature of a financial statement depends on the system of meanings of which it is a part. Thus, any description of a social "fact" involves an interpretation of cultural symbols and the meanings used in everyday life. This interpretation of others' descriptions involves an interaction between the social scientists and the phenomena being studied in a way that does not occur in the natural sciences. In the latter case, scientists can create their own observation language for theoretical purposes without having to consider whether their descriptions are connected to those of participants'. Social scientists, on the other hand, have to understand the everyday meanings of symbols and actions in particular cultural contexts if they are to use them to constitute the objects of investigation. Adequate descriptions of social phenomena thus require some understanding of participants' conceptions since these form the "empirical base". For example, any comparative study of the accounting profession in Europe would have to appreciate that the English idea of "profession" is different from that held by many continental cultures and so the meaning of the term "professional accountant" varies between national cultures (Friedson, 1986, pp. 30-37; Macdonald, 1985). Methodological norms for the human sciences, then, have to include criteria for evaluating the adequacy of descriptions which incorporate the "correct" interpretation of events in terms of dominant cultural conventions.

The meaningful nature of social phenomena has a further three major consequences for methodological theories, and also implications for the possibility of developing theories of social processes which would enable accountants and managers to control outcomes more effec-

tively in the way advocated by Watts & Zimmerman. First, universal laws are improbable, if not impossible, since languages, meanings and hence phenomena vary greatly and are subject to change. Thus comparing theories in terms of their generality may not be a useful way of assessing their merits. Highly general theories such as neo-classical economics may be inferior to more specific ones simply because there are few, if any, phenomena to which they refer.

Second, basic statements are not simply constructed by researchers but, as we have just seen, involve everyday descriptions and theories. If these latter change then so too do the criteria for assessing the adequacy of scientific descriptions and so the generality of these. What might, then, have been an acceptable description for "testing" a theory in certain conditions becomes unacceptable when those conditions alter. Furthermore, everyday descriptions may be contested by conflicting groups within cultures and language communities so that standards for evaluating evidence which presume a consensus of social actors may be inapplicable. Theories of scientific method which require scientific agreement on what counts as a basic statement, such as Popper's, either have to extend that requirement to participants' accounts — in which case they may not be relevant to much social research — or to develop rules for dealing with conflicting descriptions about what happened. Such rules have, of course, been developed by historians and other "interpretative" human scientists but these typically do not fit into the sort of methodological norms preferred by adherents to the doctrine of the unity of the sciences and a single "scientific method". Again, this double contestability and revisability of empirical evidence implies the limited nature of general statements in the human sciences and the limited domain over which theories can be valid.

Third, the meaningful nature of social phenomena implies that they are conceptually interrelated and so alter when their relations to other phenomena change. This implies that relations between social entities are internal. Two or more objects are internally related when their being a particular type of social object depends

on their connections to each other (Harré, 1979, pp. 88–89). To be a husband, parent or employee, for instance, a person has to be married, have children or be paid for work by an employer who has certain property rights over the use of one's capacities. If these latter relations do not hold then the previous descriptions of social roles are false. Thus the nature of particular social phenomena depends on how they are related to other phenomena. This means that causal explanations which require the cause and the effect to be ontologically separate are not applicable to social processes. Thus theories which are modelled on Newtonian mechanics and presume that changing relationships between phenomena do not change their nature are inappropriate for the explanation of social processes, nor of course are they appropriate for significant areas of the natural sciences (Prigogine & Stengers, 1984).

For example, the growth of large managerial hierarchies in the U.S.A. has been explained in terms of their relative efficiency in integrating mass production with mass marketing practices in particularly favourable circumstances (Chandler, 1977, 1981) and/or in reducing transaction costs in situations of high uncertainty (Williamson, 1975; Kay, 1984, pp. 79–100; Daems, 1983). The underlying productive mechanism in these accounts is imperfect competition realised and mediated by particular institutional arrangements. By generating such hierarchies, though, these arrangements and the operation of competitive markets themselves change, as is evidenced by the ability of large firms to diversify and change market boundaries (Karpik, 1978). Thus causal mechanisms may produce particular phenomena in particular situations but in doing so they are themselves altered because of the internal relations between social entities. Methodologies requiring universal causal laws expressing strictly deterministic, external relations between invariant structures and effects are, then, not appropriate to the social sciences.

These differences between the natural and the social sciences mean that methodological norms for evaluating knowledge claims in the former

are by no means appropriate for the latter. They are also connected to a further differentiating characteristic: social phenomena only occur in "open" systems whereas natural phenomena can be generated in closed systems by laboratory experiments (Bhaskar, 1979, pp. 57–62). Open systems are those in which invariant empirical regularities do not obtain and so cannot provide tests of theories in the way advocated by many methodologies of the natural sciences. Since it is only in closed systems that constant conjunctions between events can be produced predictions of social events are always tendential and not deterministic.

Together with the internal relatedness of social phenomena, this point implies severe restrictions on the development of formal theories of social processes which could enable managers, investors or anyone else to achieve specific outcomes by systematically varying particular inputs. The idea that scientific research will lead to the construction of precise and complete quantitative theories of social phenomena which could be incorporated into managerial and accounting techniques, in a similar way to theories of ideal machines and electron discharges in light bulbs being incorporated into engineering design methods (Channell, 1982; Reich, 1985, pp. 121–126) seems unrealisable. Watts & Zimmerman's claim (1986, p.14) that accounting research will enable practitioners to make better decisions, because it will tell them what the consequences of different choices will be, implies that the system being manipulated is closed, well understood and independent of practitioners' beliefs and actions. Once it is agreed that these conditions do not hold then accounting research has to be justified in terms of other goals and criteria.

Instead of searching for some idealised theory of closed social systems in the style of neo-classical economics, as Watts & Zimmerman and other disciples of Chicago seem to wish, these points suggest that accounting researchers concerned to understand accounting practices with a view to "improving" them in some way should become more modest in their aims and focus on how particular social processes helped to pro-

duce particular sets of practices in certain circumstances. The constitution and change of accounting practices as ways of generating various sorts of information for different groups then become objects requiring explanation rather than taken-for-granted "realities". Such explanations necessarily involve epistemological issues since accounting information purports to describe particular social realities for recipients who may act on it (Mattessich, 1972). Any theory of accounting practices which takes them to be problematic questions their adequacy as knowledge producing conventions and claims superior epistemological status. In so doing it implies alternative accounting practices which would be better because they are based upon methodological rules which claim to generate superior knowledge to everyday accounts. Since accounting practices generate information and knowledge, then a social theory of how and why those practices developed and operate as they do presupposes the superiority of its framework for producing knowledge in explaining them, and presumably this framework can be extended to improve their validity.

For example, if it is claimed that a particular change in accounting conventions was "really" due to powerful business elites bringing pressure to bear upon accountants rather than because of technical improvements based on normative accounting theory, this implies that the social scientist or accounting researcher has a set of methodological rules which enable her or him to produce more valid knowledge than that relied upon by the FASB or similar bodies. This "better" knowledge reconstructs the change and the rationalisations adduced in its favour as phenomena to be explained by a broader and more complete social theory of accounting practices. As such, this theory could, in principle, be used by accounting standards bodies to formulate better conventions, relative to particular purposes, than before because it increases their knowledge about their own practices and the validity of their justifications, as well as providing some guidelines about the generation of more valid information about social practices.

In this view then, accounting research should provide not only explanations of why particular practices occur and change, but also why practitioners come to have incomplete or false beliefs about them. Social scientific explanations, that is, are superior to everyday accounts of events insofar as they provide reasons for mistaken beliefs about events and phenomena as well as better accounts of them. Such explanations could improve accounting practices if practitioners modified their beliefs and actions accordingly and so the "application" of social theories resembles a process of "enlightenment" rather than modifying inputs to a relatively closed system. By providing better understandings of why particular conventions arise and how they function, accounting researchers should enable practitioners to improve their practices and procedures that produce accounting information for particular purposes in particular situations. This process would, of course, change social realities in such a way as to render the original social scientific explanation inapplicable.

#### THE RISE OF MODERN ACCOUNTING RESEARCH

If the sort of research summarised and advocated by Watts & Zimmerman does not follow the methodological rules they claim to adhere to, and in many cases these are neither characteristic of the natural sciences, nor free from internal incoherence nor directly applicable to the social sciences, then it may be wondered why so much of it has been done in the past two decades in the U.S.A. and elsewhere. Although an important part of the answer to this question is the prevailing academic prestige hierarchy and the relative ease of carrying out and publishing quantitative research using publicly available and machine readable data compared to field studies (Hopwood, 1983; Kaplan, 1986), this does not explain why such a strong prestige hierarchy became institutionalised in the U.S.A. in the 1960s nor why practitioner elites apparently acquiesced in its domination of college training programmes.

A full discussion of these questions cannot be given here but some of the major influences and factors can be indicated. Essentially, the development of modern accounting research can best be understood as part of the general expansion of higher education in many industrialised countries in the 1960s and 1970s combined with the widespread belief that scientific research could not only increase our mastery over the natural world but could also resolve social problems and help to manage social change. This belief in scientific knowledge as a crucial resource in maintaining and improving the social order has been particularly strong in the U.S.A. since the Progressive era (Bledstein, 1976, pp. 123–127, 324–331; Wiebe, 1967, Chapter 6) and received a considerable reinforcement from its evident military utility in World War II (Kevles, 1977, pp. 367–392). As is well known, the success of operations research in that war encouraged many to believe that similar techniques and approaches could produce useful knowledge for managing social organisations and dealing with social problems (Hall, 1983). Additionally, the long period of economic growth in many societies in the 1950s and 1960s enabled some economists to proclaim successfully the validity and utility of their knowledge — to the extent that large numbers of economists were recruited by many national bureaucracies (Coats, 1981).

The prestige and perceived utility of the natural sciences, mathematics and economics encouraged leading business schools in the U.S.A. seeking to improve their general prestige to invest in “scientific” research. This tendency was directly supported by the Carnegie and Ford foundations who published major reports on business education in 1959 by Gordon & Howell and Pierson *et al.*, which called for an expansion of “scientific” research in U.S. business schools. This sort of research emphasised hypothesis testing, quantitative methods and the development of formal models which promised to provide techniques for solving managerial problems and controlling social processes (e.g. Pierson *et al.*, 1959, pp. 313–314). These foundations also gave more material support for this kind of work

in the form of substantial grants and publishing opportunities which considerably assisted the development of more “rigorous” research in Finance and Accounting (Dyckman & Zeff, 1984).

The popularity of this type of research, and its rapid diffusion to most of the embryonic fields of management research, can then be partly explained by its contemporary social prestige and the recruitment of applied mathematicians, “behavioural scientists” and economists. It also, however, provided a number of benefits to those seeking academic respectability and autonomy at the same time as claiming to improve managerial techniques. First, by insisting on the importance of mathematical modes of reasoning and expression business school academics could exclude practitioners from the assessment of their research competence and techniques. Together with commitment to highly formalised and abstract economic theories, this increased barriers to entry and provided the basis for a relatively standardised training system and means of certifying academic competence in a similar manner to the mathematisation of college engineering courses in the 1880s and 1890s in the U.S.A. (Calvert, 1967, pp. 60–80; Levy, 1980, p. 201). The expanding labour market for research skills in business and management was thus organised and controlled by easily recognised and tested competences which could be inculcated through formal training programmes.

Second, it facilitated the production of large numbers of highly restricted and specific research results on a wide range of topics. The basic techniques of mathematical modelling and statistical analysis can be applied to all sorts of problems and issues without having to learn large amounts of descriptive details. In a competitive system where researchers have to publish quickly and frequently to gain attention, tenure and promotion, this style of research is preferable to one which insists on detailed and lengthy observations of accounting practices in organisations, such as that espoused by Kaplan (1986). It also reduces uncertainty about the validity of research outcomes because this becomes a technical matter rather than a concep-

tual or theoretical one. Competition between researchers can readily be mitigated in this situation by specialisation on different topics because there is no need to demonstrate the theoretical relevance of one's results.

Third, by basing their research style on the mechanistic model of social systems and claiming the ability to offer complete understanding of such "machines" putative accounting researchers were able to combine entry barriers with the promise of better techniques for control. The search for general statements about invariant relationships, which could be translated into managerial procedures for manipulating social processes to achieve determinate results, justified abstract and mathematical formulations. Measurement and closure were encouraged because they seemed to be "scientific" and to provide firm predictions about the results of resource allocation decisions. This search for quantitative precision and simplicity is reminiscent of the U.S. Bureau of Public Road's attempts to turn road design into a "scientific" activity by extensive laboratory testing of relationships between two and three variables under highly restricted and artificial conditions. As Seely (1984) makes clear, not only did these take much more time and effort than was originally thought but they did not derive from any fundamental theoretical model and were useless to practising engineers. The field trials conducted by state engineers which attempted to mimic critical features of environmental conditions and use patterns proved much more applicable and significantly improved road design.

These advantages of quantitative methods and mechanistic models help to explain their rapid adoption by academic researchers of business and management eager to demonstrate their scientific powers. They do not, though, explain why practitioners, especially those whose skills might be thought to be threatened by the new "scientific" basis of practical techniques, apparently acquiesced in their exclusion from knowledge production and assessment. Accountants in particular might be considered likely to oppose such a "scientification" of skills and practices, especially in the U.S.A. and the U.K. where they

are organised as a self-policing and legitimating profession.

In the case of the U.S.A. this acceptance of the new style of research in accounting can be partly explained by the long standing domination of vocational training by the colleges and universities, especially since the elite private colleges established professional schools at the end of the 19th century. Similarly, since the 1920s "science" has tended to be used as a means of legitimating expert authority and excluding outsiders, such as immigrants, from access to elite occupations (Auerbach, 1971; Freidson, 1970; Larson, 1977). Thus basing professional skills upon academic knowledge is a relatively established practice in the U.S.A. However, such knowledge need not be nomological and deductive to fulfill these functions, as is shown by the development of legal "science". This consisted of analytical induction from cases, according to Auerbach (1971, p. 552), and formed the basis of a distinct occupation of law teachers and reformers.

The acceptance of more formal, quantitative and deductive forms of research and knowledge in accounting in the U.S.A. can, I suggest, be seen as the result of three major factors. First, insofar as accounting practices and conventions have traditionally been legitimated by any theoretical position, they have depended upon marginalist economics (Tinker, 1985, pp. 107-113). Consequently, the integration of accounting research with economic theory and adoption of economic reasoning in formulating research problems are difficult to oppose without appearing to deny the existence of any coherent theoretical foundation for such research.

Second, although Watts & Zimmerman and their colleagues claim the utility of their research for accounting practitioners, their "laws" and hypotheses have little or no implications for accounting practices because they are not about them in any meaningful sense. Rather, the bulk of these studies deal with imaginary worlds of economic equilibria where information is true and costless and everyone acts "rationally" and so cannot form the basis for reorganising and rationalising accounting practices and skills in

uncertain social worlds where people have heterogeneous expectations, goals and beliefs. Current practices and conventions are not, then, threatened by this sort of research because it does not deal with them.

Finally, the inflation of the 1970s and growth of legal interventions in the financial system rendered traditional accounting practices suspect and in need of some revision and additional legitimization. Just as one result of the inflation of the Weimar Republic was to increase the attention paid to academic theories of accounting entities (Locke, 1984, pp. 163–165, 272–273), so too these exigencies in the 1970s encouraged the professional elite to enlist academics and implicitly claim the authority of “science” for proposed revisions. It seems probable that the growth of litigation in accounting matters will further stimulate this search for “scientific” justification of conventions and practices.

### CONCLUSIONS

The expansion and redirection of accounting

research in the 1960s and 1970s formed part of a general growth in academic research about business and management in the U.S.A. and its orientation to “scientific” norms and procedures. As such, it reflected widespread beliefs about the usefulness of scientific knowledge for managing problems and processes and the need to reorganise training programmes around such knowledge. The outcome has been the institutionalization of a distinct knowledge production system in the U.S.A. and elsewhere which is separate from practitioners and closely linked to research in finance. This field is dominated by intellectual values and conventions derived from orthodox economics and, programmatically, at least, from popularised logical empiricist philosophy of the natural sciences. Watts & Zimmerman's *Positive Accounting Theory* is an attempt to confirm this domination and to colonise doctoral programmes in accounting with these values. Given the way the academic career system operates in the U.S.A., it seems probable that they will be successful even though their analysis is seriously flawed and relies on theories of scientific method that are incoherent and inapplicable to accounting research.

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